DEPARTMENT OF GEOSCIENCES AND GEOGRAPHY A26

Collaborative planning of urban green infrastructure – need, quality, evaluation, and design

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ACADEMIC DISSERTATION
To be presented, with the permission of the Faculty of Science of the University of Helsinki, for public examination in lecture room P674, Porthania, on 16 May 2014, at 12 noon.

DEPARTMENT OF GEOSCIENCES AND GEOGRAPHY A26 / HELSINKI 2014

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ISSN-L 1798-7911
ISSN 1798-7911 (print)
ISBN 978-952-10-9463-7 (paperback)
ISBN 978-952-10-9464-4 (pdf)
http://ethesis.helsinki.fi

Unigrafia
Helsinki 2014

Faehnle, M. 2014. *Collaborative planning of urban green infrastructure – need, quality, evaluation, and design*. University of Helsinki, Department of Geosciences and Geography, Helsinki. 53 pages and 5 figures.

ABSTRACT

Urban green infrastructure refers to the network of nature areas and elements in an urban region, from the relatively natural ecosystems to such man-made structures as constructed parks. This infrastructure is shaped in policy-making and planning on land use and management and development of nature areas. In Finland, involving residents in this planning is routine practice and also required by legislation. In collaborative planning, diverse residents and other stakeholders are invited to participate in planning and decision-making processes, with the aim of influencing the information content of planning. However, the unclear role of residents' input makes collaboration inefficient for planners and residents. In the green infrastructure context, a particular challenge for the use of residents' input is the strong role of ecological expertise.

This thesis develops methods for evaluating and designing collaborative processes in planning and decision-making on urban green infrastructure and the ecosystem services it provides, from the point of view of residents' involvement and the use of their experiential knowledge. Empirical data were gathered in the Helsinki metropolitan region in 2007 using semi-structured expert interviews and a survey. In the interviews, 16 public officials, 6 decision-makers, and 11 stakeholders, including 8 active members of resident or nature associations and 3 land property owners, discussed their views on and experiences with collaborative planning of land use and management and development of nature areas. The survey was sent in 2002 to actors who had participated in collaborative urban forest planning groups in Helsinki in 1995–2002, with responses subsequently received from 33 planning authorities, 43 other authorities, and 354 residents (62.5%).

The findings address five themes: 1) the need for and 2) quality of collaborative planning, 3) its evaluation and design, 4) challenges related to ways of thinking, and 5) ways to improve usefulness of collaborative planning for different parties. The need was specified with a typology of needs for residents' input and by clarifying the role of the input at normative, strategic, and operative levels of policy-making and planning. The quality of collaborative planning was addressed with success criteria for a collaborative planning process, linked with quality aspects at the system level. A framework was developed for addressing the use of the criteria for evaluation and design purposes. Ways of thinking were addressed by developing a typology on ways to value experiences in relation to ecological issues and combining it with a typology on ways to think about the role of residents' participation. Ways to improve usefulness of collaborative planning were identified based on the findings of the four other themes.

The main contribution of the thesis to research and planning practice is the set of methods developed: the framework for evaluation and design of collaborative planning, the typology of needs for residents' input, and the typology of ways of thinking regarding the relation of experiences and ecological issues. These methods can be used to inspire target setting, in design and evaluation of collaborative planning of urban green infrastructure in urban contexts, and partly in collaborative planning more generally.

Residents' input is necessary for value guidance for policies and plans, for planning cultural ecosystem services and cultural dimensions of other ecosystem services, for making green infrastructure functional from residents' point of view, for enhancing capacities for production of well-being benefits, and for assessing how policy-making and planning succeed in supporting residents' well-being and these capacities. In integrating various knowledges in planning of urban

green infrastructure, the way of thinking which sees the relation of experiences and ecological issues as depending on scales can be particularly useful because of the scale-dependent nature of ecosystem services.

In systems such as that in Finland, usefulness of collaborative planning could be improved by strengthening the use of experiential knowledge at the normative level, including clarifying in the norms the role of residents' input and the responsibilities of officials and decision-makers in taking the input into account. This would be supported by developing guidelines that specify principles for defining and studying essential benefits of green infrastructure and its ecosystem services in different types of cases, including what types of information need to be used when and which spatial, temporal, social, and ecological contexts must be considered in defining stakeholders and benefits and conditions for service provision.

Moreover, usefulness of collaborative planning could be improved by building awareness of implications of different ways of thinking for the outcomes of planning in different types of cases; by designing the participation consciously with attention to its role in sense-making and knowledge-building at the system and process levels; by making more out of the obtained information by interpreting it from different perspectives and directing it to processes in which it can be used; and by supporting continuous learning with evaluation and follow-up.

Keywords: collaborative planning, public participation, experiential knowledge, green infrastructure, urban ecosystem services, urban planning

TIIVISTELMÄ

Kaupunkiseudun viherrakenne viittaa luontoalueiden ja -elementtien verkostoon, johon kuuluvat niin luonnontilaiset ekosysteemit kuin ihmisen luomatkin luontoalueet, kuten rakennetut puistot. Viherrakennetta muovataan maankäyttöä ja luontoalueiden hoitoa ja kehittämistä koskevassa politiikassa ja suunnittelussa. Suomessa asukkaiden osallistaminen tähän suunnitteluun on vakiintunut ja lainsäädännön vaatima käytäntö. Vuorovaikutteisessa suunnittelussa asukkaita ja muita osallisia kutsutaan osallistumaan suunnitteluun ja päätöksentekoon ajatuksella, että osallistuminen voi vaikuttaa suunnittelun tietosisältöön. Asukkaiden osallistumisessa syntyvän tiedon rooli on kuitenkin epäselvä, mikä tekee vuorovaikutuksesta turhauttavaa niin suunnittelijoille kuin asukkaillekin. Viherrakenteen suunnittelussa asukkailta hankitun tiedon hyödyntäminen on erityisen haasteellista, koska viherrakenteessa on totuttu korostamaan ekologista asiantuntemusta.

Tässä tutkimuksessa kehitettiin menetelmiä vuorovaikutteisten prosessien arviointiin ja suunnitteluun viherrakennetta ja sen tuottamia ekosysteemipalveluja koskevassa suunnittelussa ja päätöksenteossa. Näkökulmana on asukkaiden osallisuus ja asukkaiden kokemuksellisen tiedon hyödyntäminen. Empiirinen aineisto koottiin puolistrukturoiduilla asiantuntijahaastatteluilla vuonna 2007 ja kyselyllä vuonna 2002. Haastatteluissa 16 viranhaltijaa, 6 luottamushenkilöä ja 11 osallista (8 asukas- ja luontojärjestöjen edustajaa ja 3 maanomistajaa) kertoi vuorovaikutteista maankäytön ja luontoalueiden hoidon ja kehittämisen suunnittelua koskevista näkemyksistään ja kokemuksistaan. Kysely lähetettiin Helsingissä vuosina 1995–2002 viheralueiden suunnittelun työryhmiin osallistuneille. Kyselyyn vastasi 33 suunnitteluviranhaltijaa, 43 muuta viranhaltijaa ja 354 asukasta (62.5%).

Tulokset käsittelevät viittä teemaa: vuorovaikutteisen suunnittelun 1) tarvetta, 2) laatua ja 3) arviointia ja suunnittelua sekä 4) ajattelutapoihin liittyviä haasteita ja 5) keinoja parantaa vuorovaikutteisen suunnittelun hyödyllisyyttä eri osapuolille.

Työssä muodostettiin typologia tarpeista asukkailta hankittavalle tiedolle ja selvennettiin tämän tiedon merkitystä suunnittelun normatiivisella, strategisella ja operatiivisella tasolla. Laadun tarkastelussa kehitettiin kriteerit vuorovaikutteisen suunnitteluprosessin onnistumiselle. Kriteerien pohjalta koottiin viitekehys avuksi vuorovaikutteisen suunnittelun arviointiin ja tulevien prosessien suunnitteluun. Ajattelutapoja tarkasteltiin muodostamalla typologia tavoista arvottaa kokemuksia suhteessa ekologisiin näkökohtiin ja yhdistämällä se typologiaan osallistumisen tarkoituksesta. Keinoja vuorovaikutteisen suunnittelun hyödyllisyyden parantamisen määriteltiin neljän ensimmäisen teeman tulosten perusteella.

Työn tärkein anti tutkimukselle ja suunnittelulle on siinä kehitetty menetelmäpaketti: arvioinnin ja suunnittelun viitekehys, typologia asukkailta hankittavan tiedon tarpeista ja typologia kokemusten ja ekologisten näkökohtien suhteesta. Menetelmiä voidaan käyttää inspiraation lähteenä vuorovaikutteisen suunnittelun tavoitteenasettelussa, prosessien suunnittelussa ja arvioinnissa kaupunkiseutujen viherrakennetta koskevassa suunnittelussa ja osin vuorovaikutteissa suunnittelussa yleisemminkin.

Asukkailta hankittavaa tietoa todetaan tarvittavan politiikan ja suunnittelun arvopohjan muodostamisessa, kulttuuristen ekosysteemipalveluiden ja muiden ekosysteemipalveluiden kulttuuristen ulottuvuuksien suunnittelussa, viherrakenteen kehittämisessä asukkaiden kannalta toimivaksi, hyvinvointihyötyjen syntyä tukevien kapasiteettien lisäämisessä ja sen arvioinnissa, miten politiikka ja suunnittelu onnistuvat tukemaan näitä kapasiteetteja ja asukkaiden hyvinvointia. Ajattelutapa, jossa kokemusten ja ekologisten näkökohtien suhde nähdään riippuvaisena mittakaavasta, voi olla kokemuksellisen ja ekologisen tiedon yhdistämisessä erityisen hyödyllinen, koska myös ekosysteemipalvelut ovat mittakaavasidonnaisia.

Suomessa vuorovaikutteisen suunnittelun hyödyllisyyttä voitaisiin parantaa vahvistamalla kokemuksellisen tiedon hyödyntämistä suunnittelun normatiivisella tasolla. Suunnittelun normeja

voitaisiin päivittää selventämällä niissä asukkailta hankittavan tiedon tarkoitus ja toimijoiden vastuut tiedon hyödyntämisessä. Apua olisi ohjeista, joissa esitettäisiin periaatteet viherrakenteen ja ekosysteemipalveluiden olennaisten hyötyjen määrittelyyn ja tarkasteluun. Tähän sisältyisivät ohjeet siitä, millaista tietoa tarvitaan missäkin vaiheessa ja mitä spatiaalisia, ajallisia, sosiaalisia ja ekologisia kontekseja on otettava huomioon määriteltäessä osallisia, hyötyjä ja palvelujen tarjonnan edellytyksiä.

Vuorovaikutteisen suunnittelun hyödyllisyyttä voitaisiin parantaa myös edistämällä tietoisuutta erilaisten ajattelutapojen vaikutuksesta suunnittelun tuloksiin. Esimerkiksi asukkaiden kokemusten pitäminen ekologisiin näkökohtiin nähden toissijaisena voi tarkoittaa, että hukataan mahdollisuuksia asukkaiden kannalta hyvän elinympäristön aikaansaamiseen ja tulevaan yhteistyöhön. Kokemusten asettaminen etusijalle taas voi johtaa siihen, että suunnittelu heikentää ekosysteemipalvelujen tarjonnan ekologisia edellytyksiä. Hyödyllisyyttä tukisi se, että osallistuminen suunniteltaisiin tietoisesti osaksi merkitysten luontia ja tiedonrakennusta suunnitteluprosessissa ja järjestelmätasolla. Hankittua tietoa voitaisiin hyödyntää tehokkaammin tulkitsemalla sitä eri näkökulmista ja ohjaamalla sitä prosesseihin, joissa sitä voidaan käyttää. Hyötyä olisi myös jatkuvan oppimisen edistämisestä arvioinnilla ja seurannalla.

Asiasanat: vuorovaikutteinen suunnittelu, kansalaisosallistuminen, kokemuksellinen tieto, vihreä infrastruktuuri, urbaanit ekosysteemipalvelut, kaupunkisuunnittelu

ACKNOWLEDGEMENTS

In 2002, I became curious about the daily bustle of the green area planning at the City of Helsinki, a new world I entered as a trainee official. What a range of tasks there was for the planners to manage! I got to take part in organizing collaboration with residents and preparing material for decision-makers. My interest in collaborative planning was evoked, obviously to stay. I want to thank Professor Pasi Puttonen at the Department of Forest Sciences, University of Helsinki for helping me find my way to the city of Helsinki. Without this help, I would not have ended up on the exciting path that included the start, and now the finalization, of this thesis.

There are many others without whom this thesis would not exist. I can hardly thank my supervisors, Professors Liisa Tyrväinen and Harry Schulman, enough for guiding me with intelligent questions, comments, and ideas and collaborating with me in many other ways over the years. Thanks also to the rest of the co-authors: Pia Bäcklund, who has been an invaluable guide, inspirer, and friend since our first meeting in 2002, and Professor Jari Niemelä and Vesa Yli-Pelkonen, who provided instructive explorations of linkages between 'the ecological' and 'the social'. Having you five around me has made my PhD journey an empowering experience also when things did not go as planned.

I am grateful to all of the survey respondents and interviewees for their contribution. Thanks to the officials at the municipalities who kindly allowed me to familiarize myself with the planning work by participating in administrative meetings and accessing all of the material. Thanks to Johanna Jokinen who I was happy to have as a partner in working with the interview data, which Johanna subsequently used in her Master's thesis. Your enthusiasm and joy of life still continue to inspire me. I also thank the pre-examiners, Professors Jussi Jauhiainen and Raine Mäntysalo, for the insightful comments and suggestions that helped me to finalize this work.

Listing the names of all individuals who contributed to this project would make this section too long so I'll only acknowledge some key persons. Since the year at the City of Helsinki, the main periods of preparing this thesis have taken place at the Finnish Forest Research Institute METLA and from 2008 onwards at the Finnish Environment Institute SYKE. The intensive start at METLA was possible thanks to the project 'Greendecision – Integrating Ecological and Social Information in Urban Planning' lead by Jari Niemelä at the University of Helsinki. The METLA period was educational especially with the many international urban forestry activities, largely thanks to Liisa Tyrväinen. I thank also all of the other splendid colleagues for the friendly atmosphere and lively discussions we had on the 'floor of the social science people'. The Research Programme for the City of Helsinki 2007–2009, of which Greendecision was a part, provided an important context for the study. The activities of METLA's programme Wellbeing From Forests (2008–2013) have provided valuable opportunities for reflection and learning.

After METLA, SYKE attracted me with its wide scope of interests including built environment and land use planning. I thank Professor Eeva Furman who in 2008 welcomed me to SYKE as an external researcher and has continued to encourage me ever since. I had the privilege of becoming one of the staff at SYKE's Environmental Policy Centre, which was an ideal place to continue this study. Being formally external for the most of the time has not prevented me from feeling 'internal', so cooperative and friendly is the culture. Heartfelt thanks to all colleagues, including my supportive managers Tarja Söderman and Kari Oinonen. I am also grateful to Eeva and Kari for helping me to organize the layout of the introduction of this thesis and to Ritva Koskinen for skilfully performing the layout work. Any mistakes that remain are mine.

The finalization phase was made possible in the context of a study on scales as part of the research programme 'Ensure – Enhancing Sustainable Urban Development through Ecosystem Services', a collaboration of the University of Helsinki Centre for Environment HENVI and SYKE. Thanks to Tarja, without whom I would not have immersed myself so deeply into the world of scale issues,

which was highly helpful especially in putting the parts into a whole. Thanks to Leena Kopperoinen, who took over Tarja's role in Ensure after Tarja's new employment. I was sad to lose Tarja but happy to get Leena, another expert and long-time friend. Ensure has been influential for my learning about the answers to the research questions of this thesis also because of the multifaceted explorations of urban sustainability in the Ensure group as a whole. Thanks to all partners for stimulating discussions and to the programme manager Susanna Lehvävirta for enthusiastically encouraging interaction across the different disciplinary perspectives.

This thesis was arduously slow in the making, but I am not at all sorry about having spent time on many other projects and activities during these years. Most of these have in any case contributed to the thesis process in one way or another. Thanks to all of the not-yet-mentioned people with whom I have been able to have discussions and learn. These include my colleagues and collaborators in the projects for developing collaboration tools and practices at SYKE as part of the Action Programme on eServices and eDemocracy SADe and in the projects at the Association of Finnish Local and Regional Authorities and the Helsinki Neighborhoods Association Helka. My attempt to make my research productive for planning practice has benefited also from the activities of the Finnish Society of Housing and Planning and the research-practice networks KARA and ViherKARA, which have addressed issues of urban form and green infrastructure in the large urban regions of Finland. The COST E33 STSM visit to ETH Zürich under the supervision of Professor Klaus Seeland was important for my familiarization with the academic discussions on collaborative planning. The research project 'Multicultural Urban Nature' deepened my understanding of 'the cultural aspects'. Many seminars, conferences, and courses, especially the PhD students' seminars led by Harry, have been precious sources of inspiration and feedback. CARe-FOR-US, the Nordic-Baltic Centre of Advanced Research on Forestry Serving Urbanised Societies, has been a valuable interface for continuous international reflection.

I thankfully acknowledge my funders and everyone who helped me to receive funding. Thanks to the City of Helsinki Green Area Division and the European Commission FP5 project QLK5-CT-2001-00165 (Article III) and the Academy of Finland project 110388, the University of Helsinki Centre for Environment HENVI and SYKE (the other articles and the introduction). CARe-FOR-US II supported the language revision of the introduction, and SYKE funded its layout.

My deepest gratitude goes to the people who have kept me in touch with life outside work. Thanks to Kaija and Heikki, my parents, for unquestioning support and for giving me freedom to follow my interests. Saija, my sister, thank you for showing that doing what one is really interested in is the way to make future dreams come true. I look forward to you and Rael getting the opportunity to settle down in Finland so that we can meet more often. Finally, Andrés, I am truly grateful for your love, understanding and patience with me often preferring to work on my thesis instead of going for a walk or seeing the lizards. With you by my side, I feel that any difficulties in life can be overcome.

Helsinki, March 2014

Maija Faehnle

CONTENTS

LIST OF ORIGINAL ARTICLES

I Faehnle, M., Bäcklund, P., Tyrväinen, L. 2011. Looking for the role of nature experiences in urban planning and decision-making: a perspective from the Helsinki Metropolitan Area. Sustainability: Science, Practice, and Policy 7:1, 45–55.

II Faehnle, M., Tyrväinen, L. 2013. A framework for evaluating and designing collaborative planning. Land Use Policy 34, 332–341.

III Sipilä, M., Tyrväinen, L. 2005. Evaluation of Collaborative Urban Forest Planning in Helsinki, Finland. Urban Forestry and Urban Greening 4:1, 1–12.

IV Faehnle, M., Bäcklund, P., Tyrväinen, L., Niemelä, J., Yli-Pelkonen, V. How to integrate residents' experiences in planning of urban green infrastructure? Case Finland. Submitted to Landscape and Urban Planning.

Article I was developed jointly by the three authors, led by MF. All three contributed to the research idea, analytical approaches, and structure of the article. The writing was mainly done by MF.

Article II was developed by the two authors, with MF as the lead author. MF collected and analysed the data and contributed to the analytical approaches and writing process. LT contributed to the introduction, discussion, and description of methodology, and supervised the work.

Article III was developed by MF (MS at the time the article was published) and LT, with MF as the lead author. MF initiated the idea, collected and analysed the data, and contributed most of the writing. Both contributed to data collection, analytical approaches, and structure of the article. LT also supervised the work.

Article IV was developed by the five authors, led by MF. MF and PB specified the structure of the article based on the research idea initiated jointly by all five authors. MF collected and analysed the data and contributed most of the writing. PB contributed to the introduction, discussion, and description of methodology. VY-P provided ecological expertise. JN contributed to the description of findings and the discussion. LT contributed perspectives on the links between nature and health to the introduction and discussion, and supervised the work.

1 Introduction

Cities are known as the source of and the cure for major social and ecological challenges, from health problems and social inequalities to degradation of ecosystems (Secretariat of… 2012; UN 2012). Decision-making in urban contexts is challenged by various demands on different scales, including global mitigation of climate change, halting biodiversity loss, and enabling good living conditions for local residents. In aiming for holistic sustainability, urban policies need to support maintaining functioning ecosystems and social, ecological, and economic benefits arising from their ecosystem services (e.g. Söderman et al. 2012). Urban sustainability refers to the ability of an urban system to maintain its ability to reproduce itself at an acceptable level (Campbell 1996; Dempsey et al. 2011), including the capacity to ward off or respond to crises by conscious actions that keep the system viable in changing circumstances (Davoudi et al. 2012, 309). Acceptable reproduction entails definition and identification of benefits, including those from ecosystem services, that are just and equitable across groups in current and future generations (Dempsey et al. 2011; see also Ernstson 2013). European urban regions are obliged to meet these objectives so that the EU target to halt the degradation of ecosystem services by 2020 will be achieved (EC 2011).

Building the capacity for acceptable reproduction requires learning processes that become possible through collaborative action, especially collaborative planning (Innes and Booher 1999; Ahern 2011; Robards et al. 2011). In collaboration involving various actors as stakeholders and experts, problems to be addressed, benefits desired, identification of 'the acceptable' and 'the possible', and their concretization into planning solutions can be negotiated. In urban policy-making and planning, key stakeholders include the diverse people living in urban regions, herein referred to as residents. These people are highly different in terms of lifestyles, values, and needs related to their environment, interests and abilities to collaborate, roles in society, etc., and referring to them as a single 'group' is an oversimplification. Acknowledging this limitation of 'residents' and also of other categorical concepts such as 'planners', 'officials', and 'decision-makers', I use these concepts for sake of brevity, while not losing sight of the internal diversity of these groups.

The role of residents in shaping urban futures by participating in planning is the core of this thesis. In planning literature, the need to involve residents in planning is generally discussed with two main arguments: 1) their participation can enhance the legitimacy of the planning institution and 2) produce knowledge needed for creating well-informed plans (Forester 1993; Campbell 2006; Sager 2012). Of many possible viewpoints, I approach collaborative planning above all from the knowledge perspective, in particular in terms of the role of residents' experiential knowledge. Although the legitimacy aspect is not my focus, it is touched upon occasionally, as I see the two arguments as closely linked. Without a collaborative approach, a planning institution risks its legitimacy, especially if involving residents is required by legislation, as it is in Finland. The information produced in participation provides planning a source of legitimation (Demszky and Nassehi 2012), but for planning to appear legitimate from the residents' point of view this input also needs to be taken into account. The processes of sense-making and knowledge-building are therefore an essential focus of the research.

In urban regions, planning essentially includes planning of green infrastructure, the network of nature areas and elements, from relatively natural ecosystems, such as forests, to man-made structures, such as constructed parks and gardens. In European policy debates, attention to green infrastructure has been regarded as promising for responding to many of the major social and ecological challenges (EEA 2011; EEA 2012; Naumann et al. 2011). The European green infrastructure strategy (EC 2013) promotes integration of a conscious green infrastructure approach to various policy fields and spatial planning in order to mobilize investments to sustain and enhance the various services and benefits from nature in a holistic

way. This requires integration of various perspectives and expertises, none of which can suffice on their own (e.g. Collier et al. 2013). Residents have a role in these integration processes because services and benefits can only be understood with the help of the people for whom green infrastructure is aimed to serve, and services only exist when there are people benefiting from them (Fisher et al. 2009). Planning of provisioning and regulating services requires above all ecological and technical expertise, while cultural ecosystem services can only be planned by understanding how local people value and experience their environment (Fish 2011; Daniel et al. 2012a). Information on residents' values and experiences is necessary, among others, in defining and balancing benefits from maintaining green infrastructure and benefits from densification of the urban form (Bogunovich 2012; Kyttä et al. 2013a; Schmidt-Thomé et al. 2013).

Policies and plans become defined in struggles of competing arguments on whose benefits count in each particular situation, making decisions crucially dependent on whose values and knowledge are used (Ernstson 2013; Hauck et al. 2013a). In planning of urban green infrastructure, use of the input from residents' participation is challenged by the strong role of information based on ecological expertise (Evans 2007; Yli-Pelkonen 2008). Ecological information is often prioritized over information on residents' values and experiences partly because of legislative requirements for ecological studies. For example, in Finland, the legislation on land use and environmental impact assessment requires studies on biodiversity impacts, e.g. in strategic land use planning. The legislation's requirement to assess impacts of plans on peoples' health and living conditions does not explicitly require use of information from residents themselves, even though involving residents in planning is mandatory (Land Use and Building Act 1999/132). As described by an official from the Helsinki metropolitan region, "*participation is a bit like an outside oddity in the land use planning process, an obligatory thing to be implemented. Means to make it an integral part of the process have not really been found and this probably is the reason that both planners and residents are dissatisfied with the situation. Something should be done about this*."

Use of any information needs to depend on its quality, i.e. how relevant and adequate it is in relation to the purpose in question, in this case for improving policies and plans for addressing sustainable urban development. Obtaining proper information from residents can be challenged by, for example, diminished municipal budgets, as resources are prioritized for the obligatory studies. There may not be time to design and implement procedures for reaching diverse resident groups in each case, and collaboration may be reduced to simple data collection without organized opportunities for different parties to discuss and process the information further. However, a profound challenge is that the quality that should be sought is difficult to define. Actors of the policy and planning system may have differing views about how and when in the policy and planning processes the input from residents' participation should be used (Bäcklund 2007), but above all, the actors may not necessarily regard it as information worth taking seriously (e.g. Davoudi 2012). In Finnish municipal decision-making, the role of residents' input is unclear in general (Bäcklund and Mäntysalo 2010) and complicated further in planning ecosystem services because of the complexity of ecological and social processes and structures and their interactions in production of services and benefits (Reyers et al. 2013). Because of this complexity, defining what ecological information is needed for a planning process is also challenging. Ecological studies can be used in planning without understanding their limitations, with critical consequences on the quality of plans, demonstrated by, for example, studies on the Finnish practice of impact assessment in strategic land use planning (Söderman 2012).

Despite the human-centric nature of the ecosystem services concept, studies on ecosystem services tend to consider people mainly at the end of the continuum, as beneficiaries linking values to benefits arising from services predefined on the basis of ecological expertise

(Reyers et al. 2013). Studies on integrating ecosystem services in spatial planning (e.g. Cowling et al. 2008; DeGroot et al. 2010; Koschke et al. 2012) rarely consider residents' values and experiences as information sources. Information obtained from residents is neglected in policies and planning of urban areas in Finland (Staffans 2004; Puustinen 2006; Bäcklund and Mäntysalo 2010; Leino and Laine 2012) and generally in various decision-making contexts (Haas 2004; Holden 2012; Innes and Booher 2013; Pfeffer et al. 2013). Planners and other experts often dismiss citizens' comments as 'anecdotal' and tend to aim at educating citizens rather than learning from them (Innes and Booher 2013). Tensions arise from the subjective nature of residents' input relative to information derived from ecological expertise, or in general information from professional or scientific sources (Fazey et al. 2006; Raymond et al. 2010; Delvaux and Schoenaers 2012). The general emphasis on science-based arguments in decision-making steers debate away from the tragic choices that encompass competing values, the production of winners and losers, and recognition that the capacities for producing ecosystem services are bounded (Robards et al. 2011). Confusion around the use of residents' input keeps collaborative planning ineffective, diluting residents' trust in the policy and planning system, planners' interest in collaborating, and in general capacity building conditons.

Whose voices and benefits count in urban development is a matter of access to processes in which effective decisions are made and prepared. Local decision-making in Europe is increasingly controlled by the EU and driven by processes of global market forces, but the ability that municipalities still have in addressing power relations locally is essential for constructing grounds for urban sustainability. Here formal planning processes have a limited, albeit not insignificant, role. In Finland, the Land Use and Building Act is currently under reformation, with participation as one of the issues requiring revision (Ministry of Environment 2014; Staffans 2012). A concern is the need to manage both flexibility and strict regulation, the former enabling reaction to changes in dynamic ecological-social and economic processes, and the latter enabling their control. The need to maintain official forums for participation persists because these are the primary means of participation for some resident groups (Niemenmaa 2002), and they facilitate the coordinated learning, decision-making, and action of the policy and planning system.

The purpose of this dissertation is to support development of planning and decision-making practices that make use of, rather than neglect, the potential of collaboration in enhancing urban sustainability. The empirical data are from the Helsinki metropolitan region, and the results are bound to specificities of the Finnish political, administrative, and cultural context. However, universal dimensions of the linkages between urban green infrastructure, knowledge, and planning are of interest, as in this more general context the Finnish case can contribute to understanding and learning in other urban areas and planning situations (Stake 1995; Flyvbjerg 2006). With mainly qualitative data, I explore the challenges and development needs surrounding collaborative planning of urban green infrastructure and address ways of developing methods for its evaluation and design.

1.1 The Finnish context for collaborative planning of green infrastructure

In Finland, legislation has enabled residents to influence their living environments and has mandated opportunities to participate in decision-making (e.g. Kettunen 2002). The national constitution (1999/731, 20§), for example, requires public authorities to create mechanisms that allow residents to shape the future of their living environments and, by extension, their own well-being. The Land Use and Building Act that came into force in 2000 gives special attention to resident participation in land use planning. The Act defines the types, content, and preparation process of land use plans. Many of the largest urban municipalities are big landowners, but also private lands are under the control of municipalities, as land use planning is a monopoly of the municipalities. In principle,

the power to guide urban development comes from residents of the municipality, through the incorporation of their values into decisions by the elected municipal decision-makers. I use the term representative decision-making to refer to decisions by the elected municipal decision-makers in particular, while decision-making covers also the decisions made in preparation of these decisions.

In the formal policy and planning system in Finland, decisions affecting green infrastructure are made at normative, strategic, and operative levels of policy-making and planning, especially those concerning land use, and at a more detailed scale, management and development of nature areas and elements. The normative framework for planning is formally laid in municipal policies, e.g. in land policies, city strategies, and green area programmes, in the framework of the legislation and national policies. There are three levels of land use plans, the lowest level approved being the one in force. The regional plan is made by the regional planning office, a coalition of municipalities deriving its power from 'representative decision-making' in municipalities. Steered by the regional plan, municipalities make local master plans and local detailed plans. For planning management and development of nature areas, there is less regulation from the national level. Municipalities have applied various approaches, e.g. green area programmes and nature management plans for the whole municipality and management and development plans for green areas by city districts, in some municipalities in combination with streets.

In practice, the formal system derives its meaning from actions in which these structuring rules are practiced (e.g. Healey 1997; Forester 2013). This realized setting of policy-making and planning and the role of residents in it are ambiguous (Bäcklund and Mäntysalo 2010). Cities and their administrative departments apply a variety of approaches to collaboration, representing mixtures of planning ideals and conceptions of good democracy. In the continuum of planning theories from the comprehensive-rationalist, incrementalist, and communicative to the agonistic, the structures of the Finnish policy and planning system continue to support the comprehensive-rationalist model. However, some examples of shifts towards agonism can be identified, simultaneously with attempts to complement aggregative democracy with agonistic democracy. (Bäcklund and Mäntysalo 2010) The involvement of various informal actors and arrangements blurs the formal roles and rules (Hajer 2003). Green infrastructure is affected by plans and actions of various actors, including municipal departments responsible for, for instance, housing and sport facilities, national actors, e.g. road administration, regional actors, e.g. the Helsinki Region Cooperation Assembly, and private companies. Influential decisions on land use are partly made separately from the representative decision-making, for example, as informal collaboration bodies prepare such instruments as regional structural models to guide formal planning (Mäntysalo and Jarenko 2012). In the ongoing renewal of the Land Use and Building Act, it is acknowledged that the participatory process often remains a formality and there is a need to pay attention to linkages of participation with partnership planning and the creation of structural models (Ministry of Environment 2014). Participation is required in the formal zoning process, while important decisions in directing the development of the living environment are made elsewhere, before, alongside or after it (Jauhiainen 2012; Staffans 2012).

1.2 Aim of the thesis

The aim of this thesis is to develop methods for evaluating and designing collaborative processes in planning and decision-making on urban green infrastructure, from the point of view of residents' involvement and use of their experiential knowledge. The purpose thereby is to increase understanding of the quality of current collaboration and knowledge practices and the needs for and ways to achieve improvement from the perspectives of planning and various stakeholders. This aim is addressed in four articles (Fig. 1, Table 1) by answering the following research questions:

(1) Why is residents' participation needed in planning urban green infrastructure?
(2) What constitutes the quality of collaborative planning in terms of residents' participation and the use of their experiential knowledge?
(3) How can this quality be evaluated and taken into account in designing collaboration?
(4) How is the use of residents' experiential knowledge in planning challenged by administrative actors', decision-makers', and stakeholders' ways of thinking?
(5) How can the use of residents' experiential knowledge in planning be improved, especially its integration with ecological expert knowledge?

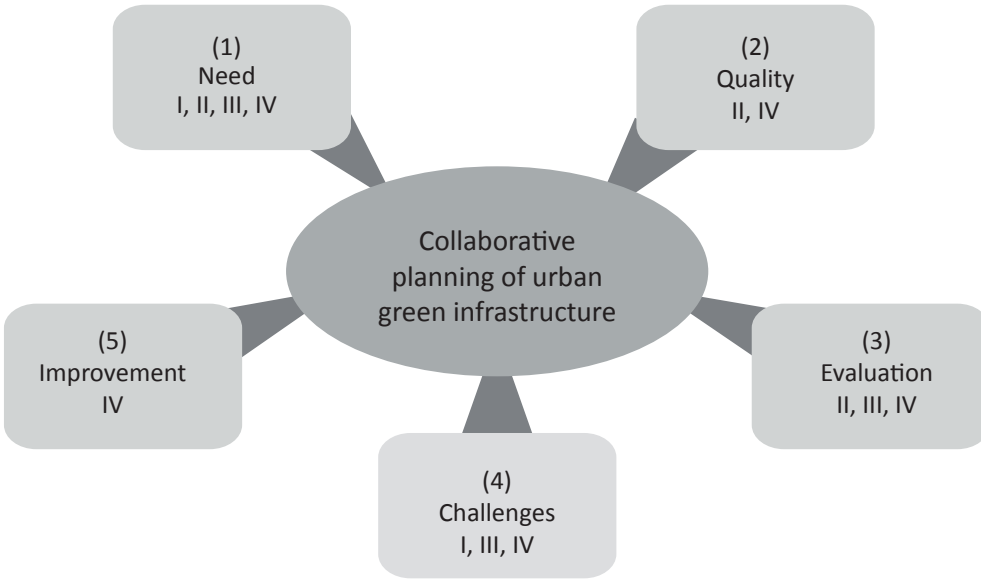

Figure 1. Articles (I, II, III, IV) addressing research questions (1)–(5).

Table 1. Focus, data, methods, and key outcomes of the articles.

	Article I	Article II	Article III	Article IV
Focus	Experienced dimension of urban nature, experiences as source of information alongside ecological and technical issues	Developing a framework for evaluation and design of collaborative planning in the context of strategic planning of land use and management and development of nature areas	Evaluating residents' and authorities' experiences with collaborative planning of urban forests in Helsinki	Ways of thinking about the relation of experiences and ecological issues, need for information on residents' values and experiences in planning
Data and methods	Literature review, examples of collaborative planning in the Helsinki metropolitan area	33 semi-structured interviews with officials, decision-makers, and stakeholders in Helsinki metropolitan region	Survey to participants of planning groups of collaborative urban forest planning in Helsinki 1995–2002, yielding 430 responses (62.5%)	33 semi-structured interviews with officials, decision-makers, and stakeholders in the Helsinki metropolitan region
Outcomes: understanding, **approaches and methods** as support for practice and research	Role of experiences as a source of information for normative, strategic, and operative levels of the policy and planning system	Quality aspects of collaborative planning; **Framework** for evaluation and design of collaborative planning	Residents' and authorities' experiences with collaborative planning; **Example** of obtaining information for evaluation of collaborative planning	Ways to support integration of experiences in planning; **Approach** to study integration; **Typology** of needs for residents' input; **Typology** of ways of thinking

2 Conceptual background

The theoretical background of this research is an interdisciplinary mix in the intersection of regional studies and urban forestry, both fields being interdisciplinary as such. As a field of geography, regional studies examines interactions between society and nature, with interest in regions and their economic, social, political, cultural, and ecological changes (Murdoch 2006; Pike 2007). Regional studies underlie the geographical approach through spatiality, whereby urban nature is of interest as part of the infrastructures that form an urban region as a physical entity. Planning geography, within regional studies, brings in the framework for analysing actions for addressing the development of an urban region and its green infrastructure. This includes collaborative planning as a key concept, bound with theories of urban policies and planning in general. Through collaborative planning, attention is paid to the content and making of policies and plans, here with special interest in the role of experiential and ecological knowledge.

The field of urban forestry, in its European interpretation, concerns all elements of urban green structures, their multiple benefits, and policies and planning related to these (Konijnendijk et al. 2005). In my work, urban forestry brings in understanding of nature management and urban ecology as bases for planning urban *nature*, which differs from planning of urban space in general. Finally, as the interest is in relations between ecological and social aspects of urban nature, I find useful the concept of ecosystem services as it, like the concept of urban green infrastructure, is inherently integrative and aimed at bridging perspectives from natural and social sciences. With the key concepts (Fig. 2), the thesis explores the crossings of lifeworlds, ecological entities, system realities, and normative action in addressing urban development.

Figure 2. Key concepts (bolded) and underlying ideas.

2.1 Urban green infrastructure and its ecosystem services

In both academic and policy contexts, there has been increasing interest in the concepts of green infrastructure and ecosystem services (DeGroot et al. 2002; DeGroot et al. 2010; Mell 2011; Lafortezza et al. 2013) in urban environments (e.g. Niemelä et al. 2011; EEA 2012; Hubacek and Kronenberg 2013). 'Urban' and an urban region can be defined in various ways (see Andersson et al. 2009), however, here I use urban to refer to an area with dense population, a relatively high proportion of impervious land, and nature strongly affected by actions of people. Urban region then is a region in which areas with these characteristics appear, along gradients from mainly built-up to mainly unbuilt. Urban system, or urban social-ecological system, is not a uniform system, nor is it distinct from other systems, e.g. global communication systems, and the universal realm of values such as democracy and equity (Pike et al. 2007). However, by focusing attention to areas and systems with urban characteristics, the concepts of urban region and system help in analysing urban social-ecological interactions.

Especially before the ecosystem service thinking took hold since the Millennium Ecosystem Assessment (2005), attempts to conserve nature competed with other land use interests as a distinct perspective, with the view of nature as opposite to the urban. With the ecosystem services concept, attention is drawn to benefits people get from ecosystems and thereby to synergies in maintaining nature in areas under development (Douglas and Ravetz 2011). It is now increasingly recognized that maintaining functioning ecosystem is bound to maintaining benefits for people, and that via the synergistic approach, substantial ecological, social, and economic benefits can be achieved (DeGroot et al. 2010). Via the ecosystem services approach, it becomes possible to identify and understand processes of service generation, which helps in assessing what kinds of processes can be stimulated and how they can be directed in planning (Primmer et al. 2012).

Differing views and uncertainties surround, for example, the relation of services and ecosystem functions and processes (Lamarque et al. 2011; Cardinale et al. 2012) and the usability of

the concept in taking into account various benefits and values of different population groups (Chan et al. 2012; Ernstson 2013). Ecosystem services have been defined *as* benefits (MA 2005), and as *contributions* of ecosystems *to* benefits (Bastian et al. 2012). Following the definitions by Fisher et al. (2009), I understand ecosystem services as contributions to human well-being based on ecological phenomena, and services existing only when there are people benefiting from them. Ecosystem services are the production of benefits that are of value for people (Chan et al. 2012), for example, regulation of microclimate (service) contributes to human thermal comfort (benefit), and production of sounds from nature and cushioning of noise from traffic (services) contribute to calming experiences (benefit). Correspondingly, ecosystems are a source of disservices when people experience harmful aspects in them (Lyytimäki et al. 2008; Lyytimäki and Sipilä 2009). To understand how to value various benefits in planning, it is necessary to pay attention to what people value in general, that is, their deeply held values arising from their ways of thinking (Healey 1997; Chan et al. 2012). These values direct the ways to regard aspects of ecosystems as beneficial, indifferent, or harmful, and they guide peoples' activities related to production of services and benefits (Fig. 3).

Some ecosystem services are needed similarly by the whole population (e.g. need for UV protection by the atmosphere) or they can depend on area characteristics such as population density (e.g. increased need for maintenance of heavily used recreation areas). With many services, however, needs are more complicated as they vary between persons and groups. Availability of services can change by their use, e.g. picking berries leaves fewer berries for others. Some service are non-rival in the sense that consuming them does not preclude the use by others (Fisher et al. 2009), for example, a landscape is in principle not made less enjoyable by someone else watching and listening to it. In heavily used areas, opportunities for such use

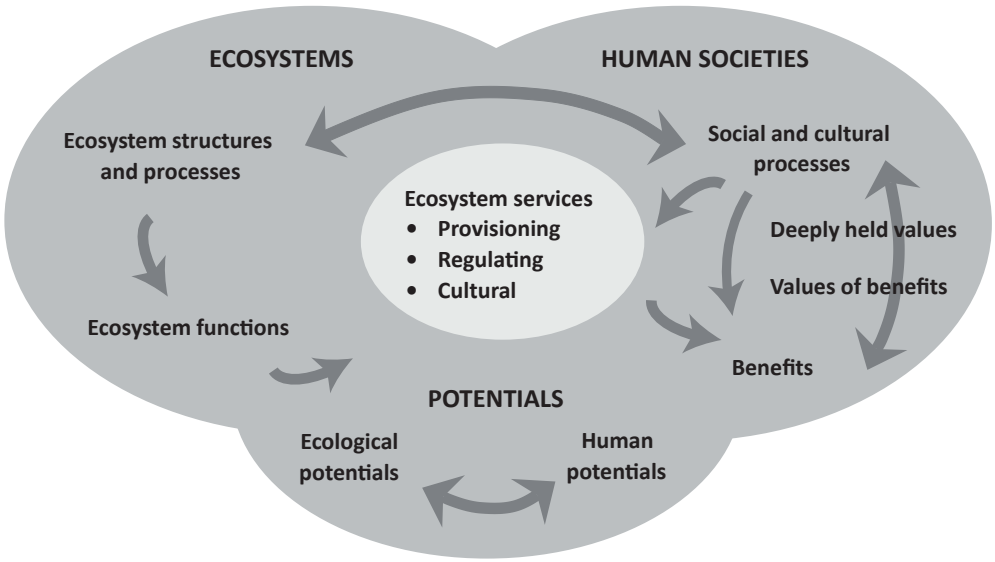

Figure 3. Provision of ecosystem services is affected by social and cultural processes (e.g. daily activities in urban space, planning, management) that shape and are shaped by people's deeply held values. These values matter for how people define aspects of ecosystems as beneficial and attach value to benefits. The potential provision of services relies on interaction of ecological and human potentials, including ecological capacities and human capacities to contribute e.g. by cultural and technical innovations. Figure inspired by Potchin and Haines-Young (2011) and Bastian et al. (2012).

of nature can become rival, e.g. as the presence of other users limits opportunities to experience peacefulness.

From the perspective of urban residents, cultural ecosystem services, such as opportunities for appreciated nature experiences and various activities in nature areas, can be emphasized because these services are often directly experienced (Gobster et al. 2007), compared with the more 'hidden' regulating services (e.g. stormwater retention, carbon sequestration) or provisioning services often produced outside the urban area (e.g. provision of food and raw materials). Cultural ecosystem services are the contributions of ecosystems to immaterial benefits that arise from human-nature relationships (Chan et al. 2012). They are specific in the sense that the characteristics of green infrastructure to which these services are related can only be determined by considering the specific needs of a particular human or social actor at a given place and time, and this is fully dependent on first understanding the subject culture (Daniel et al. 2012a; 2012b). This makes planning of cultural ecosystem services different from planning of provisioning and regulating services. Assessment of provisioning services, such as production of food and fresh water, is relatively simple because their contribution to human well-being is easy to recognize. Many of the products also have market prices that can be used in economic service assessments. Information from residents can help in understanding social processes and structures and cultural aspects related to other services, e.g. the practices of gardeners in production of food in urban gardens, related social network dynamics, and the multiple well-being benefits gardening produces besides food (Barthel 2008; Fish 2011; Bendt et al. 2013). However, assessing the need and capacities for producing provisioning and regulating services essentially relies on consideration of ecological and technical rather than cultural aspects.

The concept of green infrastructure was first introduced in the USA at the end of the 1990s, with the aim of supporting the protection of natural systems from disturbances by urbanization (Benedict and McMahon 2006). In Europe, green infrastructure has been interpreted with urban approaches involving hybrid infrastructures of green spaces and built systems that are planned and designed to support multiple functions (DG Environment 2011; Pauleit et al. 2011, 272). These hybrid infrastructures include spatially and functionally integrated systems and networks (Ahern 2007) of such areas and elements as meadows, forests, wetlands, shores, parks, green roofs and walls, and trees that together contribute to human benefits by ecosystem services and to ecosystem health and resilience and biodiversity conservation (IEEP 2011; Naumann et al. 2011; EEA 2012). When framed as 'infrastructure', these areas and elements are brought into discussions on infrastructures in urban development, together with partly overlapping approaches such as the blue (water), grey (built, including e.g. roads, transport facilities), red (new developments of housing and business areas), brown (soil), and white (snow, for example, as a provider of recreation opportunities such as skiing) infrastructures (Pouyat et al. 2010; De Roo 2011, 10; IEEP 2011; Lafortezza et al. 2013). Following the above definitions, I understand urban green infrastructure as a network of areas and elements, forming an integral part of the urban system that serves ecosystem functioning and human well-being by ecosystem services. As the areas belonging to this green infrastructure include both 'green' and 'blue' areas, I prefer the term 'nature areas' to 'green areas'. Urban green infrastructure thus here includes the blue infrastructure. The term green infrastructure in my work refers to this urban green infrastructure, although when necessary, I specify the wider green infrastructure of which urban green infrastructure is a part.

With the notion of green infrastructure, the ecosystems, their services, and related human benefits can be analysed in the spatial context. In planning urban areas and their green infrastructure, several spatial-temporal scales need to be addressed, from the most local to at least the scale of the urban region (Borgström et al. 2006; Cumming et al. 2013; Lafortezza et al. 2013). A regional approach makes it possible to consider connectivity of areas and elements,

which is essential for ecosystem functioning, but also for the functioning of the urban area from the point of view of residents (Ahern 2011). In Finnish urban regions, the area in which residents move in their everyday life has widened in recent decades, and this mobility is increasingly taking place at the regional scale (Vasanen 2013). This widens also the spatial scale of the green infrastructure, which is a part of their everyday environment, and emphasizes the need to consider its variation from urban cores to peri-urban areas (Radford and James 2013). How effective green infrastructure is in meeting its goals requires understanding of these issues of functional connectivity, their linkages to the spatial arrangement of green infrastructure features, and the values and meanings linked to these. A challenge of planning green infrastructure is thus to understand and consider it with different dimensions of space: as the absolute, physical space, the relative space with processes and functions, and the relational space with experiences and meanings linked to the physical and the relative (Tuan 1979; Harvey 2004). In the context of a region, the relative dimension is essential as it stresses that the regions' development is uneven, calling for attention to be paid to the crucial questions of who benefits and loses from particular varieties of development (Murdoch 2006; Pike et al. 2007). By and large, physical space can be measured and designed; models have been developed for assessing complex ecological and social processes of relative space. However, the third, intangible world of values and meanings remains more difficult to handle. This is the world that drives the development of regions and needs to be explored in order to understand whose values the development is pursuing (Pike et al. 2007) and what is needed to make the realization of well-being benefits and disservices more equitable across population groups and generations.

2.2 Planning of green infrastructure

Urban development is consciously addressed by various decisions and agreements, partly regulated by formal processes of the local policy and planning system. By planning, I mean planning and decision-making processes by which society intentionally addresses the future of an urban region and its green infrastructure, in particular processes resulting in norms, policies, strategies, and plans. Planning includes shaping of the physical environment and the processes in which it is governed (Healey 2003).

In Finland, for example, the status of land use plans as legislatively binding makes these plans potentially effective in directing the development according to specified policy goals, although the role of the formal system has been decreasing in the sense that planning and policy-making is increasingly taking place in informal processes outside the system (e.g. Jauhiainen 2012; Mäntysalo and Jarenko 2012). From the point of view of the goals of urban sustainability, the formal system remains, however, important, as it is through this system that society can try to control and coordinate the various processes and build the political will needed for committing to the sustainability goals.

Planning of green infrastructure here refers to policies and planning affecting urban green infrastructure, in particular through processes of land use and management and development of nature areas and elements. This planning enables, restricts, and regulates generation of ecosystem services and their distribution, i.e. who can benefit from them (Ernstson 2013). At the normative policy level, general value-based goals are defined as guidelines for more specific policies and strategies and their operationalization. Strategic planning aims at specifying the value purposes defined at the normative level into precise practical goals, adapted to interests arising from local conditions. (Schulman 1990). Strategic spatial planning is about shaping the dynamics through which larger urban regions evolve (Healey 2010, 440), including strategic planning of land use and management and development of nature areas within the framework of land use plans. Policies and strategic and operative levels of planning operate in complex processes across the levels and their temporal horizons, e.g. through arrangements based on networks (Bulkeley 2005). The hierarchy, however, lays the ground for translating goals

into concrete improvements in ecological conditions and in people's experienced realities. Nesting plans at different spatial levels with each other enables holistic planning of green infrastructure of an urban region as part of the wider green infrastructure, up to the international level (Lafortezza et al. 2013).

Given the variety of national and local planning cultures and needs, there is no single definition of green infrastructure planning, but instead a set of shared principles has been identified as guidance for different contexts (Pauleit et al. 2011). Planning should maintain and develop green infrastructure as *multifunctional*, meaning that nature areas provide a multitude of functions for multiple uses, and more so as a network than as areas on their own. Planning should support *connectivity* of multiple nature areas and features, their specific functional character and quality, and their spatial characteristics and requirements. Moreover, it is necessary to view green infrastructure and built-up infrastructure as *integrated* partners and take into account interaction and linkages between them. Planning should be *communicative and inclusive*, bringing different actors together in a process of mutual learning and understanding of benefits and costs of land use options. This includes enhanced collaboration between experts in different disciplines and making their work more accessible to collaborative planning and management. Finally, green infrastructure should be planned with a *long-term strategy*, adopting a sustainable development concept, whereby long-term benefits instead of short-term economic gains are considered. (Pauleit et al. 2011)

2.3 Collaborative planning

The above principle of communicativeness and inclusiveness reflects the contemporary thinking that involving various actors is a necessity in urban planning. This collaborative or communicative paradigm has dominated the theoretical planning discourse since the 1980s (Tewdwr-Jones and Allmendinger 2002). Consideration of diverse actors' values and perspectives arose as an alternative to the rationalistic planning that was based on the belief of a superior role of scientific knowledge and planner's expertise in defining good solutions (Taylor 1998; Healey 1992b). Differing from the earlier idea of advocacy planning (Davidoff 1965), collaborative planning highlighted the inclusive process, which enables exploration of the potential for a broadly workable agreement through genuine civic discourse (Sager 2012). Originally made popular especially by the works of Innes (1995; 1996), Healey (1992a; 1992b; 1997), and Forester (1989), the paradigm has evolved with diverse approaches varying in emphasis and mixture of analyses and prescription (Harris 2002; Tewdwr-Jones and Allmendinger 2002; Innes and Booher 2013).

Attempts to develop collaborative approaches to planning have been criticized for unrealistic optimism about making planning processes more just and achieving better outcomes. The critics have referred, for instance, to the impossibility of equal speech conditions, the importance of power struggles outside the formal participatory process, and the nuances of professional and political practices that can prevent consideration of stakeholders' values and perspectives despite planners' good intentions (e.g. Flyvbjerg 1998; Tewdwr-Jones and Allmendinger 1998; Fainstein 2000; Hillier 2000; 2003, see also Harris 2002). The supporters have rebutted that the critique has arisen because of misunderstanding, e.g. the ideas of good conditions for participation were not expectations of reality but meant as tools for interpretation (Innes and Booher 2013). It has also been explained how the strong role of lobby groups does not decrease the need for formal participation and that instead of letting the powerful interests dominate, planners can make use of informal power games in pursuing the goals of collaborative planning (Sager 2012; see also Olsson and Hysin 2012).

In line with Healey's (1997; 2003) conception of collaborative planning, I understand collaboration as being essentially about building collective capacities and transforming institutions, above all the existing structures of the local policy and planning system. Collabora-

tive or participatory planning in this thesis refers to planning in which diverse residents and other stakeholders are invited to participate in planning and decision-making processes with such methods as questionnaires, web forums, public meetings, and field trips, with the idea that participation can influence the content of planning (see Healey 1997; Innes 1998; Innes and Booher 1999). A key idea is that changes become possible as dialogue allows the parties involved to change their own understanding of their positions, interests, and even values (Innes and Booher 2013) that drive their actions as part of their ways of thinking (Healey 1997; Fazey et al. 2006). Collaborative planning includes managing communication challenges (Forester 1989) but also structural challenges in enabling participation of different groups (Sandercock 2003).

Planning of green infrastructure is messy and characterized by a multiplicity of actors and conflicting conceptions of what is 'good' or 'bad' in use, management, or development of land (Konijnendijk et al. 2005). As these conceptions are understood as values rooted in fundamentally different realities, there is no universal ground for defining some values or knowledges as more relevant than others (Schulman 1990; Mouffe 2000; Hillier 2003; Sandercock 2003). The role of planning thereby is to support encountering these realities and to increase understanding of their incommensurability (Bäcklund and Mäntysalo 2010). This can be studied in the light of agonistic planning theory, based on recognition of conflicts as inherent in planning (Hillier 2002; 2003) and democracy theories with agonistic aspects (e.g. Mouffe 2000). In agonistic practice, differences between values and opinions are accepted as unresolvable without passing moral judgement on them (Hillier 2002, 132). Collaborative planning in an agonistic approach is not framed with expectations of a shared reality, but with sensitivity to stakeholders' potentially very different lifeworlds and ways of thinking. This sensitivity is necessary for creating holistic planning solutions that are appropriate for these stakeholders and designing a collaborative process in which stakeholders with diverse needs and abilities have equal opportunities to participate in building the necessary knowledge.

2.4 Knowledge for planning and decision-making

The power of residents and other stakeholders to influence urban development is closely bound with their knowledge and ability to use information in a form that decision-makers find relevant (Flyvbjerg 1998). I understand knowledge as relational, dynamic, and generated intersubjectively (McInerney 2002; Hajer 2005; Bäcklund 2007) by experiences, investigation, and in communication and collaborative activities in a planning process. Knowledge is built in processes of learning, re-framing, and understanding, and information is the transformable source of knowledge (Jensen 2005). Central to knowledge is the specification of causal relationships. When causal relationships are implicit in information, it is knowledge that constructs these relationships and thereby determines if and how the information matters (Rydin 2007). However, definitions of knowledge vary; more important than the precise definition is attention to expectations about how knowledge can and should be entwined with policy-making (Campbell 2012).

In planning green infrastructure with the idea of agonism, collaboration allows actors with various values and ways of thinking to take part in making sense of the area and in constructing knowledge on it, including knowledge on which ecosystem services, benefits, and disservices matter where, how, and why. This knowledge needs to address actual and potential use and provision of ecosystem services, relations between different services in different spatial-temporal settings (e.g. Fisher et al. 2009; Maes et al. 2013), and which services can be compensated spatially or technically and under what conditions. In an early interpretation of collaborative planning adhering to Habermas' (1984) idea of rational communication, collaboration would be a means of seeking single superior answers to the planning questions. In a proactive agonistic approach, engaging diverging views in the debate is not about subordinating them

to a final best knowledge, but about acknowledging differences as persisting and using the diversity, including diversity of knowledges, as a productive force in planning (Lysgård and Cruickshank 2013).

Articulation of concerns and views in the sense-making and knowledge construction process is by nature a power struggle (Ernstson 2013; Hauck et al. 2013a, 2013b) in which actors make active, contextual interpretations about what is known (Leino and Peltomaa 2012). Diverse residents and other actors have varying abilities and resources to act in the process and make interpretations in forms that can be effective in the particular case. Construction of knowledge in participation events is strongly conditioned by the communicative setting (Van Herzele and Van Woerkum 2011; Hauck et al. 2013b) and overall by planners' control of information in the planning process (Forester 1989, 28). However, how particular knowledge influences decisions is essentially linked to the operation of the policy and planning system as a whole, for example, in timing of participatory processes in relation to normative, strategic, and operative stages of policy-making and planning.

To integrate diverse actors' knowledge in a planning process, it is necessary to identify different types of knowledge and evaluate how they might be relevant (Raymond et al. 2010). Types of knowledge, such as experiential, scientific, general, and local, cannot simply be linked to particular actors, instead, knowledge of an actor or an actor group, be they residents, planners, scientists, or whoever, represents a complex mix of various ways of knowing. Categorical characterization of knowledge is problematic (e.g. Delvaux and Schoenaers 2012; Gray et al. 2012; Innes and Booher 2013) and may lead to overly straightforward expectations of certain actors and certain knowledge types, for example, residents' knowledge as purely experiential, and planners' or researchers' knowledge as excluding experiential dimensions. However, when used with sensitivity, knowledge categories are useful for determining what different actors have to offer for the sense-making and knowledge-building process, that is, the types of knowledge and types of content they can bring to the integration table (Raymond et al. 2010; Holden 2012). By paying attention to the cognitive elements that constitute the knowledge of different stakeholders (Delvaux and Schoenaers 2012), possibilities arise for bridging the gap between their participation and the information content of planning (see Leino and Laine 2012). To be effective, this bridging needs to be framed as appropriate in relation to the nature of the choices to be made. For example, in strategic planning the incorporation of various knowledges should support focusing on strategically important questions and not on blurring them with too much detail (Laitio and Maijala 2010).

One way to categorize knowledge is to differentiate between experience-based and expert ways of knowing, the latter referring to knowledge gained by specific education. Unlike experiential knowledge, expert knowledge makes use of more systematic, scientific means (see Gray et al. 2012). In planning of green infrastructure, the necessary **ecological knowledge** essentially consists of ecological expert knowledge, as science-based approaches are needed to produce information on the ecosystem and on how it generates ecosystem services such as purification of air pollution and prevention of flooding (Schipperijn et al. 2005; DeGroot et al. 2010). This ecological information should include information on biodiversity in its spatial context, e.g. species richness, species composition, population sizes, valuable habitats (Yli-Pelkonen and Niemelä 2006; Yli-Pelkonen 2008), and ecosystem structures and key processes for addressing ecosystem interactions and trends (Söderman 2012).

Experiential knowledge in my approach means residents' knowledge based on their personal experiences, including their values, attitudes, views, and concerns related to their living environment. The inclusion of values makes experiential knowledge essentially different from ecological knowledge, which focuses on scientific, not value-based aspects of knowing. The personal experiences are constructed intersubjectively and are inherently bound with the socio-cultural context (Tani 1995; Dinnie

et al. 2013). Experiential knowledge consists of thoughts and interpretations that are lived, experienced, and believed to be true in everyday life (Bäcklund 2007). Compared with definitions of the closely related concepts of tacit, local, and lay information or knowledge (e.g. Nonaka 1991; Carr and Halvorsen 2001; Corburn 2003; Van Herzele 2004; Petts 2006), my definition emphasizes experience as the source and information as the transferable material for knowledge building in collaborative processes. Experiential knowledge can be argued, tacit knowledge cannot – otherwise it would not be tacit. Experiential knowledge can bring an understanding of context-related specificities without which policies may end up failing in practice (Nowotny 2003; Juntti et al. 2009). Attempts to pass it on as single 'facts' lose much of the value it has in being rich in details (Fazey et al. 2006; Healey 2010; Demszky and Nassehi 2012). However, quantitative summaries of experiential information can significantly enhance the knowledge base of planning (Tyrväinen et al. 2007; Kyttä et al. 2013a). In processes of knowledge integration, the experiential dimension of the knowledge of planners, decision-makers, and also researchers and research funders is crucial, as their values and experiences are the foundation on which new information is prioritized in knowledge building (Donmoyer 2000). These actors need their personal experiences, among others, for being able to study and systematize the experiences of other people (Hillbur 2009, 14). Scientific and experiential knowledges complement each other, and knowledge is most powerful when it makes use of both (Innes and Booher 2013).

3 Material and methods

The main empirical data for this thesis consist of data from semi-structured expert interviews and a survey. The analyses based on the interviews were supported by secondary information sources related to planning cases discussed in the interviews. These included group discussions with the interviewees, planning material (e.g. official decision-making documents, drafts, background material available for stakeholders, survey summaries, meeting documents, letters from stakeholders), information in local newspapers and on websites, and my observations from public meetings, field trips, and meetings of an administrative planning group. Interview data are the main data in Articles II and IV, and survey data in Article III. Article I is conceptual and based on literature.

Interview data were obtained as part of the interdisciplinary project 'Greendecision' (Academy of Finland 2006–2008), which focused on the integration of ecological information and residents' experiences in urban planning. Articles II and IV report two of the several sub-studies conducted in the project. Acknowledging the complexity of collaborative planning of green infrastructure, we chose for these sub-studies case areas that would elucidate it from several dimensions. A case approach was chosen because it enables understanding a single, complex case, and learning for generalization to other contexts (Flyvbjerg 2006). With a case approach, the research can be grounded in a context that is proper from the point of view of solving real-life problems of public policy-making and planning (Wagenaar 2011). As qualitative case research is more about particularization than generalization, its contribution to understanding wider phenomena is related especially to naturalistic generalizations that people make when learning from a single case (Stake 1995). By this psychological, not mathematical, generalization (Donmoyer 2000), people can connect findings from our Finnish study to similar kinds of cases they know, extending and modifying their existing generalizations around knowledge integration. We used our data also to propose theoretical ideas that may be appropriate in other contexts, that is, to propositional generalization (Stake 1995). These generalizations are based on connecting our analysis to existing theories and approaches in literature on planning, urban nature, and ecosystem services. As part of the whole study, the survey represents an example of ways to obtain information in evaluating collaborative planning. It aimed at a quantitative

overview of the respondents' experiences and views and makes claims about these. The whole study instead aims at supporting learning in different contexts, and thus, the overall interest is not to 'prove' how collaborative planning works, but to construct promising approaches for understanding and improving it.

In 2007, we chose two case areas in the Helsinki metropolitan area: Mätäoja-Mätäjoki located in two cities, Helsinki and Vantaa, and a cross-border area between three municipalities, Kerava, Vantaa, and Sipoo (Fig. 4). In both of these case study areas, residents use nature areas regardless of municipal borders, but their planning is the responsibility of several authorities, each operating with their own rhythms and practices of public involvement. Both areas had several ongoing and recently finished land use planning and/or nature area planning processes. The case areas counterbalance each other in characteristics such as location in the urban form, type of nature areas, type of ongoing planning processes, and size of municipalities involved (Table 2).

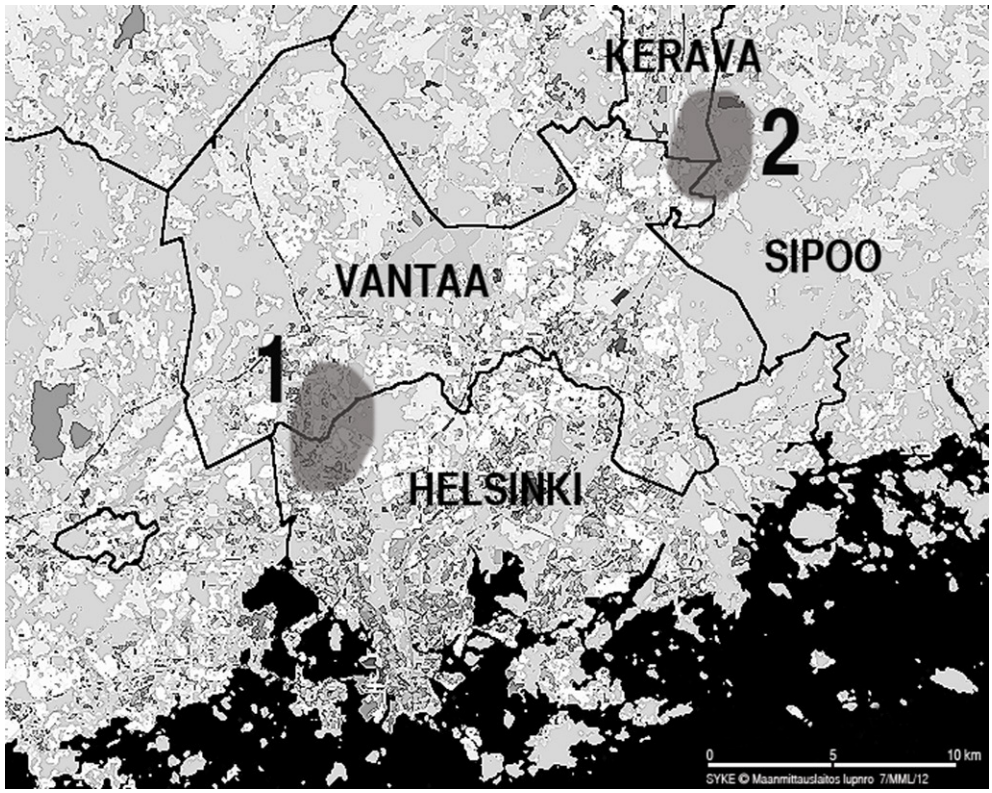

Figure 4. Location of the case areas: Mätäoja-Mätäjoki (1), Kerava-Vantaa-Sipoo (2). Figure previously published in Article II.

Table 2. Case areas.

	Mätäoja-Mätäjoki	Kerava-Vantaa-Sipoo
Area description	The area includes a popular nature area between built areas in the relatively dense urban form; a river valley with forests, fields, and parks in the surroundings. The river crosses the border of the cities of Helsinki and Vantaa and is called Mätäoja in Vantaa and Mätäjoki in Helsinki.	This corner of the three municipalities has a recreation forest continuing from Kerava to a wider forest entity in Sipoo. There is sparse population in single-family houses in a rural-like area in Kerava, next to which is a dense district with single-family houses, Korso, on the Vantaa side of the municipality border.
Municipalities governing the area	Vantaa, Helsinki	Kerava, Vantaa, Sipoo, and Helsinki in its land property in Sipoo
Ongoing and recent planning processes	– Vantaa master plan 2007 – Detailed plan for a part of Kaivoksela district (Vantaa) – Partial master plan for Kuninkaantammi district (Helsinki) – Area plan for Kaarela district 2009-2017 (Helsinki) – Management plan for Mätäoja river and surroundings (Vantaa) – Ring road II (Road Administration)	– Vantaa master plan 2007 – Sipoo master plan 2020 – Detailed plan for Bastukärr logistics area (Sipoo) – Detailed plan for Jokitie district (Kerava) – Detailed plan for KerCa logistics area (Kerava) – Forest management plan for Korso district 2017 (Vantaa) – Nature management plan for Sipoonkorpi forest 2008-2017 (Helsinki)

I interviewed 33 persons who at the time of the interview in 2007 had been involved in at least some of the ongoing planning processes in the case areas. The interviewees included 16 public officials (planners, other experts, and a consultant), 6 decision-makers, and 11 stakeholders (8 active members of resident or nature associations, 3 land property owners). Some of the interviewees had several of these roles. A decision-maker, for example, also acted as an official in another municipality. I had asked him to respond from the perspective of his role as a decision-maker and he apparently did so, though he also raised some examples from an official's point of view. As stakeholders, we selected members of resident and nature associations, because as experienced and active participants in several planning projects, they would have knowledge of collaborative planning practices and could present ideas for improvements. To get a wider view of stakeholders' perspectives, we invited land property owners in the area. The land property owners chosen were those who, according to an official in the city of Kerava, are among the key land property owners in the area. The themes discussed in the interviews included views and experiences of collaborative planning, nature relation, successful collaboration, role of ecological and experiential values in decision-making, and learning of participation skills. The interviews lasted from 30 min to 2 h 15 min. The interview material was transcribed word by word and analysed with the help of the qualitative research software NVivo 7.

For constructing a framework for evaluating and designing collaborative planning (Article II), a draft for an evaluation framework was developed based on the interview data and literature. A draft of this framework was sent to the interviewees and they were invited to discuss it in a group meeting. Five group meetings were organized, each of which contained 5-7 participants. Thirty of the 33 interviewees joined these discussions. The discussions were recorded and the records and notes taken in the meetings were used in further development of the framework. The framework was constructed by combining the interview data and most relevant literature on quality of participation. The literature included empirically oriented studies on cases of collaborative urban and environmental planning and management and transport planning mainly in European (e.g. Janse and Konijnendijk 2007; Ernstson et al. 2010) and North American (e.g. McCool and Guthrie 2001; Halvorsen 2003) contexts, but also cases in Australia (Human and Davies 2010) and New

Zealand (Scott and Liew 2012). Moreover, literature on planning practices (Carp 2004; Laurian and Shaw 2009) as well as generalized norms and quality aspects for collaborative planning and governance in more theory-oriented literature (e.g. Healey 1997; Lockwood 2010) were used.

By reading the interview transcripts while going through the literature, I first searched for general similarities in aspects of quality of collaborative planning identified in the interviews and in both types of literature. Four broad themes of these similarities were identified, forming the four main evaluation perspectives used in this study. With these perspectives as a general frame, I applied the suggestion by Stake (1995, 79) that the most important data be analysed with pre-established codes, but also studied searching for new ones. I analysed the data by identifying topics that mattered to the interviewees as criteria for quality of collaborative planning processes and classified these under the four main categories. This produced 41 criteria. These were combined and simplified with the help of results and recommendations linked to quality of collaboration found in the empirically oriented literature as well as with arguments in the theory-oriented literature. This resulted in 13 final criteria, each derived from 1–7 criteria in the first criteria set. The literature was also used as a support in formulating a description of each criterion. All the final criteria thus are rooted in both empirical data and literature. To support design of effective collaborative processes, we also summarized the criteria descriptions into a design frame as aspects worth consideration in process design.

In the second sub-study (Article IV), we used the interview data to examine how integration of residents' input to planning is challenged by administrative actors', decision-makers', and stakeholders' ways of thinking and what need there is for residents' values and experiences in planning. I analysed the interviewees' descriptions of the use of residents' input and their ways of valuing residents' experiences in relation to ecological values. I identified 18 classes of arguments that were then combined into four wider classes, forming the final typology of ways of thinking. To study the views of needs for residents' values and experiences, I analysed issues in which information based on values and experiences can improve the content of planning. This resulted in 59 issue categories. Using literature on planning, urban nature and ecosystem services (e.g. Schulman 1990; James et al. 2009; Healey 2010; Pataki et al. 2011; Rounsevell et al. 2010; Bastian et al. 2012; Van Oudenhoven et al. 2012), I identified four general themes of needs. The 59 issue categories were then grouped and combined into nine categories under these four themes, resulting in the final need typology. Moreover, I analysed from the data ways in which the input from residents can be part of different phases of a planning process. This was based on grouping the ways mentioned by the interviewees.

The **survey data** for Article III were obtained as part of a larger European project 'Neighbourwoods – Advancing the quality of life and the environment of European cities through socially inclusive planning, design and management of urban woodlands' (QLK5-CT-2001-00165) and funded by the City of Helsinki Green Area Division and the European Commission. A mail survey, conducted in order to study experiences related to collaborative urban forest planning in Helsinki in 1995–2002, was sent in autumn 2002 to all those who had participated in collaborative planning groups of the urban forest planning projects during that period. The questionnaire was designed with the help of planning officials in Helsinki and tested with a group of officials and residents involved in the planning. Altogether 732 questionnaires were distributed to planning authorities, other authorities, and participating residents. Responses were received from 33 planning authorities, 43 other authorities, and 354 residents; thus, the overall response rate was 62.5%.

The questionnaire consisted of four parts. The first part dealt with the need for and usefulness of the participatory approach in green area planning in general. In the second part, respondents were asked about their experiences with the participatory planning system and to indicate how satisfied they were with use of collaborative planning groups. The third part dealt

with suggestions for organizing participation in the future. In the fourth part, the respondents were asked to provide such personal data as age, sex, and how long they had lived in their present housing area. All questions were pre-coded and often were in multiple choice form. At the end of the second and third parts, respondents also had an opportunity to write their own comments. The answers were analysed using the statistical software package SPSS 9.0. Conclusions drawn from the answers were based on mean values and percentage distributions of the respondent groups. The questionnaire worked well since there were few unanswered questions. Missing answers were excluded from the analysis.

4 Findings

4.1 Needs for residents' participation in planning of urban green infrastructure

Building knowledge, understanding, and preconditions for collective action

Based on literature and the interviews, several arguments for residents' participation in planning were identified and interpreted for the context of green infrastructure planning. Participation is needed to enable well-informed decisions and collaboration capacities to support maintaining and developing green infrastructure as a sustainable source of well-being and urban quality of life (Articles I, II, IV). Without knowledge based on residents' experiences, policies and planning miss an essential element in their understanding of well-being and quality of life in the city (Articles I, II, IV). Based on the evaluation of collaborative urban forest planning in Helsinki (Article III), planning authorities and residents who had participated in planning found participation to be very important. Participation can be seen as necessary because it is useful in increasing authorities' awareness of local conditions and residents' awareness of matters concerning green areas, in increasing residents' appreciation for their environment, in improving the plans from the standpoint of the objectives of residents and those of planning authorities, and in preventing conflicts in planning (Article III).

Knowledge produced in participation is needed for defining **what general sustainability goals should concretely mean** in various residents' everyday life and for establishing **shared ideas as guides for collective action**. For understanding how appropriate urban policies as a whole are from the point of view of various resident groups, the normative basis of the policies needs to be reflected against the values of these groups. Obtaining information on these values is therefore necessary to assess and complement the functioning of representative democracy (Articles I and IV).

The role of participation is related to both the collaborative process and the content of the information produced in it. Policies and planning of green infrastructure need information related to the physical and ecological dimension of the urban system, its experiential and social dimension, as well as their interrelationships, including those between ecosystem functions and how the system functions from the viewpoint of various residents (Article IV; Bastian et al. 2012). Moreover, information is needed on potentials and policy and planning (Article IV). These themes structure our typology of needs for residents' input (Article IV).

To guide various actions towards realizing the desired development, participation is needed because it is a means of **making actors willing and capable of contributing**. In the green infrastructure context, building capacities for collaborative action in the future (Article II; Innes and Booher 1999; Halvorsen 2003) includes the capacity to collaborate in managing urban ecosystem services. Here residents, including their associations and organized groups, play roles as users, managers, and producers of ecosystem services (Article IV; Barthel 2008). Participation is needed for building the trust needed for this collaboration capacity (Article II; Innes and Booher 1999; Halvorsen 2003; Laitio and Maijala 2010). Building trust requires that participation is effective in incorporating residents'

experiential knowledge in planning, as trust is diluted if residents feel ignored in planning and decision-making (Innes and Booher 1999; Laitio and Maijala 2010).

Need for experiential knowledge at different levels of planning

Consistent with descriptions of experiential knowledge in literature (e.g. Fazey et al. 2006; Bäcklund 2007; Healey 2010), the interviewees characterized information obtainable from residents as diverse, contextual, rich in details, subjective, and intensely value-based. As value-based, this information is crucial for the value base of planning green infrastructure and its spatial operationalization especially regarding cultural dimensions of ecosystem services and other cultural dimensions of green infrastructure and its planning (Article IV). It provides a source of understanding for how to avoid dilution of processes that produce well-being benefits, if and how to compensate for benefits that would be weakened by specific choices, and how to increase production of well-being for various groups in the future. The future is uncertain and no knowledge can produce planning capable of fully controlling it. Values of future residents cannot be known, values of current residents are not stable, and residents who live in an area at the time of planning will not necessarily be the same as those who experience implementation of the plan. Experiential knowledge of diverse current residents is, however, essential for imagining what desirable futures could be like. Residents' input, including information on their expectations, wishes, fears, and ideas, widens the chances of planning to search for novelty solutions and identify potential opportunities (see Davoudi 2012, 435).

Based on the interviews, we developed **a typology of needs for residents' input, which specifies issues on which information obtained from residents can improve planning** (Article IV). The typology includes nine issue categories grouped by four themes of knowledge needs identified in literature (physical city and ecological issues, social and experienced city, potentials, policies and planning, see Table 3). The nine issues in the typology can be interpreted as a directory of residents' expertise, and as a guide to topics in which residents' values can be necessary for any normative steps taken in green infrastructure planning. As knowledge generation in general (Gross 2012), knowledge based on residents' values and experiences also leads to new uncertainties. This makes knowledge use complicated, but increasing uncertainties can also mean understanding what is not known, which is an important part of knowledge needed for decision-making (Gross 2012). For example, knowledge about what people value in green infrastructure can increase understanding of gaps in knowing how specific valued benefits are produced, and thereby, help in realizing how planning needs knowledge of other processes besides those linked to ecosystem services (Article IV).

The role of information on the nine issues is deeply case-specific. There are different views on the need for residents' participation at different levels and phases of planning (Articles III and IV), however, it is possible to characterize knowledge needs by the type and phase of a planning and decision-making process (Articles I and IV). In Table 3, I illustrate with examples from the literature the variation of emphases of knowledge needs at normative, strategic, and operational levels of the policy and planning system. Table 4 summarizes the role of experiential knowledge at these levels. This compilation, like the examples on information needs in different phases of a planning process (Article IV), exemplifies how knowledge needs, and thereby, the role of residents' input, can differ depending on the type of framings and other choices to be made in each situation. The identified themes are incommensurate and partly overlapping. Rather than simply finding a most appropriate category for each piece of the input obtained from residents, the idea is to pay attention to how the input can bring understanding of the different themes and their linkages from the points of view of various residents.

At the **normative** level of the policy and planning system, **value-based goals** are defined as guidelines for strategic and operative planning (Schulman 1990). Here residents' expe-

riential knowledge is necessary because, from the perspective of municipal self-government, the goals need to be based on **residents' views of what makes a good quality living environment and how the quality should be pursued** (Article I). Planning of green infrastructure needs to begin by defining the desired outcomes (Pataki et al. 2011), and this requires identification of the desired benefits and underlying values before policy decisions (Article IV). As deeply bound with the local context, experiential knowledge is a resource for grounding the norms in the particularities of the specific place and time, which is a requirement for formulating norms that actually work (Healey 2003). At the normative level, the nine issue categories of the typology thus make sense above all in their value dimensions. Experiential knowledge of the category '*experiences, service, benefits, and values',* for example, can inform policy choices by bringing understanding of residents' nature relation in general – is there a need for nature areas in the city? What ways of thinking should drive policies guiding consideration of experiential and ecological aspects of green infrastructure? Value dimension of knowledge of the category '*quality of planning'*, in turn, brings in residents' values on, for example, what kind of participation opportunities the municipality needs to organize. Qualitative descriptions of individual experiences and views inform policy-making at the normative level by bringing understanding of socio-culturally shared, intersubjective values and meanings related to green infrastructure and its planning (Articles I and IV). In quantitative, aggregated form, for example as survey data, information arising from experiential knowledge informs this policy-making about variation of values among resident groups and about size of population affected by specific policy decisions (Article I).

As at the normative level, at the **strategic** level of planning the value dimension of knowledge is emphasized because no guaranteed technical answers can be found to help define directions (Article I; Glicken 1999). Strategic spatial planning involves combining moral considerations with analytical knowledge for imagining the spatial entity in question, its connectivities, and the relation between its parts and the 'whole' (Healey 2010, 440–441). In strategic planning of green infrastructure, imagining the entity and addressing these relations requires integration of **place-based** experiential and ecological expert knowledge. Here experiential knowledge is a source of information e.g. on the cultural dimensions of ecosystem services and benefits desired from the spatial entity and its parts, functioning of the green infrastructure from the point of view of various groups' mobility and access to areas providing the kind of nature experiences they desire, social processes involved in production of services and benefits, and potentials for this production (Article IV). It complements administrative approaches by perspectives to **spatial entities as experienced realities** (Article IV) and provides understanding for producing maps for planning and communication (see Van Herzele and Van Woerkum 2011; Hauck et al. 2013b). The **cross-border nature of experiential knowledge**, noted in the category '*spatial entity'* (Article IV), is particularly significant for spatial planning and the following design as it can help understanding, for example, if and how nature experiences on visits to nature areas and nature experienced otherwise in the course of everyday living can compensate each other in producing health benefits. Ecological expert knowledge is needed for addressing how to maintain and develop the ecological functions needed for producing the desired services and benefits (e.g. Pataki et al. 2011; Busch et al. 2012). Especially in plans on a regional scale, integration of experiential and ecological knowledge includes imagining and exploring options for developing connections of nature areas so that they support at the same time the important ecosystem functions and functioning of the green infrastructure as a part of the living environments of various residents.

At the **operative** level of planning, the strategic plans are interpreted for local implementation by preparing e.g. detailed land use plans and short-term nature management plans. Operative plans include detailed description of actions, schedules, resources, and actors needed for the implementation (Schulman 1990, 70). These plans rely on value choices made in

policies and strategic plans and emphasize the **technical aspect of knowledge** (Article I). In detailed land use planning, residents' experiential knowledge of desired and existing qualities of specific sites can inform detailed choices on, for example, how to locate new buildings on an unbuilt site so that opportunities to use parts of the site for recreation could be maintained. In preparing an annual nature management plan, experiential knowledge can be of use in, for example, deciding where exactly vegetation must be cut down to improve experienced safety or anticipating where residents might be interested in managing parts of nature areas as extensions of their yards.

Table 3. Content of information emphasized at normative, strategic, and operative levels of planning green infrastructure (see Fig. 1 in Article IV). Examples based on literature (e.g. Schulman 1990; Cowling et al. 2008; Montserrat Degen 2008; Norton 2008; James et al. 2009; Mulgan 2009; DeGroot et al. 2010; Healey 2010; Robards et al. 2011; Bastian et al. 2012; Chan et al. 2012; Söderman 2012; Ernstson 2013).

	Drivers	**Physical city and ecological issues**	**Social and experienced city**	**Potentials**	**Policy and planning**
Normative level: goal setting (long-term), e.g. land policy principles, nature management principles	Broad drivers, e.g. climate change, demographic change, global markets	General physical and ecological characteristics of the green infrastructure, its past development, trends	Diverse residents, other actors, their values related to nature and its services in general, values otherwise relevant for planning	Potentials for developing new policies and strategic innovations	Ways to define goals, with moral sensitivity (who might gain, who might lose)
Strategic level: goals in spatial terms (medium-term) e.g. local master plans, green area plans	Effects of the broad drivers on the planning area, e.g. economic cycles affecting budgets, immigration stimulating cultural changes	Ecosystem structures and components (habitats, species), processes and functions, trade-offs in service generation, past development, trends	Residents and other actors for whom the particular nature areas matter, their values and demand for local ecosystem services and benefits, uses and non-use of these areas, local disservices and problems	Nature potentials, local actors' capacities in shaping nature areas and their ecosystem services	Operation of collective action in urban development dynamics, ways to support consistency of plans Past implementation of plans Ways to build a spatial strategy, with moral sensitivity
Operative level: implementation of the spatial plan (short-term), e.g. local detailed plan, annual nature management plans, park plans	–	Site qualities, ecosystem structure and components on each site (e.g. tree species and age structure of a woodland), processes and functions within and across sites	Ecosystem services, benefits, disservices and problems bound to site qualities, site as sensory environment, site use and non-use, activities affecting each site	Nature potentials of each site, local actors' capacities in shaping the site and its services	Past management of each site Ways to implement the spatial goals by design, construction, or management

Table 4. Role of residents' experiential knowledge in informing the different levels of the policy and planning system.

	Role of residents' experiential knowledge
Normative level: goal setting (long-term), e.g. land policy principles, nature management principles	• Values as basis for politics behind policy-making • Qualitative information: Understanding the local social-ecological system, approaches to needs for development, values in their context • Quantitative information: Variation of values and views in the population and its sub-groups, size of population affected by specific decisions, grounds for prioritizing values
Strategic level: goals in spatial terms (medium-term), e.g. local master plans, green area plans	• Place-based information on values and experienced realities as basis for spatial concretization of long term goals • Qualitative place-based information: understanding different areas and spatial variation in terms of characteristics of the social-ecological system, related values and development needs • Quantitative place-based information: variation of values and views between areas, grounds for priorization in spatial solutions, e.g. in locating land uses, emphasizing specific nature management styles
Operative level: implementation of the spatial plan (short-term), e.g. local detailed plans, annual nature management plans, park plans	• Detailed site-specific information as basis for implementation of the strategic decisions • Qualitative detailed site-specific information: understanding site-specific characteristics • Quantitative detailed site-specific information: grounds for priorization in detailed solutions e.g. in choosing location of a building on a site, choosing a specific park design

Need for experiential knowledge in different phases of a planning process

To address from yet another perspective how the input from residents can improve planning, we identified ways in which it can be a part of different phases of a planning process. Based on the interviews, residents' experiential knowledge can improve the sense-making and knowledge-building process in planning and decision-making in at least eight ways, e.g. in identifying stakeholders and in evaluating the quality of the background work for planning, such as the collaboration plan prepared and baseline studies conducted (Article IV, Tables 2 and 3). These ways are partly overlapping, by no means all-encompassing, and allow many interpretations; however, they raise aspects worth considering when designing a collaborative process and how it is a part of the planning process as a whole. For translating knowledge into concrete outcomes, at least as important as bringing different knowledges to the analyses is the synthesis (Campbell 2012), making it essential to pay attention to the use of residents' experiential knowledge in both throughout a planning process. In evaluating the quality of background work for planning, for example, experiential knowledge is not only a source of evaluation data but also a guide for interpreting the evaluation results for further steps in the process.

In terms of how important residents' input is at different levels and phases of planning, suggestions for good collaborative planning in the literature emphasize obtaining it early. Like at the system level, at the process level knowledge can be most effective for the outcomes when it is embedded in the early framings through which the goals are specified and forthcoming actions are approached (e.g. Healey 1997; 2010; Mulgan 2009; Söderman 2012). From the point of view of making sense in planning, experiential knowledge is needed most in the early framing and purpose-setting phase because here it is possible to make use of its value dimension. The freedom for choices decreases, in Healey's (2010) terms the opportunity structure narrows, towards operative level and later phases of a process as the nature of choices becomes more technical. The frames that the actors responsible for a process, more or less consciously, take as a given or create in the early phase direct, for example, the identification of knowledge

needs and choices of analysis approaches in later phases (Raymond et al. 2010; Campbell 2012; Holden 2012).

The empirical findings point to a diversity of views rather than any specific emphasis. The interviewees had varying views regarding the role of residents' input at different levels or phases (Article IV). The evaluation of collaborative urban forest planning in Helsinki (Article III) supported the view of a need for involving residents early in the sense that the majority of authorities and residents considered residents' participation more important in setting goals for green area planning than in choosing management measures. However, for the authorities the need for early participation may have been (also) about other meanings of participation than obtaining information, as unlike the majority of the resident respondents, the majority of the authorities found that plans made by professionals only would be good enough for implementation. In spite of the view of the majority, there were also differing views in both groups about the need for participation in goal-setting vs. choosing management measures (Article III, Fig. 7). As the majority of residents deemed that they had been given an overly optimistic impression of how much they could influence the plans, this underlines the uncertainty of the need for their input.

4.2 Quality of collaborative planning

Quality of collaborative planning can be understood as part of the quality of planning and decision-making as a whole and the administrative and political system on which these are based. Quality of collaborative planning is found in collaborative planning processes and in practices determining when and how such processes are implemented in cycles of planning, decision-making, implementation, and follow-up (see e.g. Mulgan 2009). Quality of a single planning process as a collaborative process is linked to its ability to meet the purpose set for collaboration in the specific process and relevance of the purpose in the context of local sustainability goals. A precondition for high-quality collaborative planning is that this purpose is clearly defined and the different parties are aware of it (Article II). **Design of collaborative planning at the system level** allows creation of conditions for these purpose definitions to be coherent in relation to those of other processes, and contributes to meeting the needs for collaboration at the different system levels. The success of this system level coordination determines how the quality of planning processes in the municipality and region can increase or decrease over time.

One way to conceptualize quality of collaborative planning is to define quality characteristics of a single collaborative planning process. Using the interview data and literature, we constructed a framework specifying **quality criteria of a collaborative planning process** (Article II). The criteria are grouped with four interlinked main perspectives: A collaborative process should (1) improve the knowledge and value base of planning, (2) support involvement that is meaningful for residents, (3) be operational in the policy and planning system, and (4) help in guiding the area development in a sustainable direction.

As quality of collaborative planning processes depends on the entity of policies and planning in the municipality and in the region, attention to single processes provides a window for understanding both planning practice and the relation between planning practice and its structural conditions. In planning issues requiring a regional approach, taking planning of urban green infrastructure as an example, quality of planning and collaboration as part of it are dependent on practices of different formal and informal organizations operating in the region. The regional context is important also because of the regional scale of residents' everyday life (Vasanen 2013), including their use of nature areas across municipality borders (Article II). Quality criteria of a collaborative planning process on issues with a regional dimension thus need to be interpreted and used as multi-scalar. For example, meaningful involvement for residents requires consideration of linkages of spatial and social scales, including identification of areas on which the plan can have impacts and

groups for which these areas make sense. Operational participation in the policy and planning system implies functioning linkages between formal and informal institutions operating on various levels from sub-municipal to regional.

As far as the aim is to involve residents in influencing the content of planning, the process should focus on knowledge-building as the starting point (Article II). This way it is realistic to strive for a future in which there is a widely shared view on appropriate ways to seek sustainability and different actors are committed to their implementation. If participation does not improve the knowledge and value base of planning, the quality of collaborative planning is likely to decrease also in some other criteria (Article II). Improving the knowledge and value base includes defining the specific knowledge needs in the particular case, and responding to them, intentionally with an understanding of the different actors, values, and perspectives requiring attention. This includes taking into account the potential of experiential knowledge to bring information on and enlarge understanding of the contents of planning (Article IV) and the role of values and expert aspects of experiential knowledge depending on the normative, strategic, or operative nature of the process in question (Article I). If planning aims to be sensitive to residents' values, negotiations on knowledge needs and evaluation of the information obtained in participation cannot be only in the hands of planning professionals. Quality of ecological information cannot be defined based on residents' experiential knowledge, nor can ecological or other professional expertise be an adequate basis for defining the quality of residents' input (Articles I and IV). Quality of collaborative planning thereby includes framing participation as an opportunity to build knowledge also on criteria with which it is possible to decide how to deal with knowledge gaps remaining after participation.

The extent to which collaboration supports involvement that is meaningful for residents and is operational in the system level essentially depends on functioning of the representative democracy (Article IV). In a high-quality policy and planning system, participation brings residents' values to decisions that actually guide urban development and developing of green infrastructure as part of it. In a high-quality system, collaboration is worth the effort for all parties involved. This requires implementing collaboration on levels and phases in which the knowledge produced can affect essential decisions, without making collaboration a burden for anyone. A high-quality system encourages integration of various forms of knowledge by knowingly making use of their specific characteristics as is appropriate at each level and phase. In integrating residents' experiential knowledge and other forms of knowledge, planners and decision-makers in a high-quality system do not predefine any of these as more important than others (Article I). These actors are aware of a variety of ways to value ecological issues in relation to residents' values and experiences, and give residents' experiential knowledge a role in decisions on how these are emphasized in each particular case (Article IV).

4.3 Evaluation and design of collaborative planning

Developing high-quality collaborative planning requires evaluation of the collaborative practices and the readiness and capacities to revise them. By evaluation, it is possible to identify practices worth replicating (Patton 2002), development needs, and case examples, bringing understanding of conditions that may support success of collaboration in other processes. **The framework with success criteria** (Article II) can be used as a source of inspiration for designing collaborative processes and for evaluating them in order to learn for future processes. Some of the criteria also support evaluation of an ongoing process, enabling a better-informed design of the rest of the process.

For operationalizing criteria for an evaluation, it is necessary to develop indicators and methodology that serve the aims of evaluation in the particular case. Table 5 provides examples of potential indicators and methods that could be considered in the evaluation design. The survey of views of participants of urban forest planning groups (Article III) is an **example of**

one of many ways to obtain evaluation information. It exemplifies benefits and drawbacks of survey as a method, of conducting an evaluation based on a single method, and of conducting an evaluation without using a conscious evaluation framework such as that in Article II. The survey was designed in collaboration with officials of the planning organization (Helsinki Green Area Division) to respond to their interest to learn from past processes to support designing future collaborative planning. No explicit evaluation framework was used, instead, the survey was designed based on the Divisions' practical needs, its previously defined targets for collaboration, and understanding based on literature, planning documents, and my experience with the Divisions' collaborative planning processes during my training period.

The survey served the Divisions' practical interest, however, use of a framework such as that in Article II may have enabled a more profound discussion of what could and should be measured and how. For example, discussing the criterion *'knowledge integration'* may have helped to consider whether it is useful to study the knowledge input from participation in more detail. The survey provided information on the distribution of views among the respondents and some qualitative descriptions that supported understanding reasons for the views. Another approach would be to begin with a qualitative exploration of different parties' expectations and views, thereby building understanding of what collaborative planning should achieve. A survey is a practical way to conduct a non-laborious evaluation, but combining the use of quantitative and qualitative methods would be optimal. Methods allowing stakeholders to express their concerns freely would help to reflect on and revise the presumptions made in an evaluation, including ones on tailoring evaluation frameworks for designing the evaluation methodology for a particular case.

A planning organization could use evaluation of collaborative planning processes as a quality check conducted, for example, once or twice each decade. Evaluation projects could be complemented with additional insights into the functioning of municipal democracy, for example, by comparisons of residents' and their representatives' values regarding the relation between residents' experiences and ecological issues (Article IV). As evaluation projects and practices involve value choices potentially affecting residents' lives, e.g. by changing their opportunities to have an influence on future processes, design and implementation of an evaluation must be sensitive to residents' diverse values and needs (Cooke and Kothari 2001). Collaborative evaluation projects can as such be a way to create and strengthen conditions for future collective action (Muñoz-Erickson et al. 2010). However, evaluation should not become a burden in the policy and planning system or for residents or other stakeholders.

Table 5. Framework for evaluating and designing collaborative processes of land use and nature area planning (Article II) with examples of potential methods and indicators for measuring the criteria. Key criteria are **bolded**. Criteria applicable in formative evaluation are marked with (F).

Evaluation/ design perspectives	Success criteria	Methods of evaluation	Quantitative indicators	Qualitative indicators
1. Knowledge integration *Collaboration improves the knowledge and value base of planning*	– **Adequacy of high-quality information (F)** – **Improvement of the knowledge and value base because of the use of experiential information (F)**	Analysis of participants and their input to planning, analysis of planning materials, questionnaires, interviews	– Participation rate – Diversity of groups participating (e.g. age, interest, cultural groups) – Number of points in planning materials referring to the use of experiential information – Information quality scores 1-10	– Descriptions of missing information and information quality problems – Descriptions of how information was used – Planner's view on usefulness of participation for the quality of the knowledge base
2. Meaningful involvement *Collaboration is meaningful for stakeholders*	– **Participatory process worth the effort** – Accessibility of information (F) – Adequacy of opportunities to participate (F) – Learning in the community	Analysis of the participatory process, final plan, and feedback collected from participants, media analysis, interviews, questionnaires	– Extent of information delivered on opportunities for participation – Number of solutions in the final plan referring to the use of experiential information – Proportion of stakeholders satisfied with the plan and outcome – Quantitative summary of opportunities to participate and actual participation – Proportion of participants who considered the process educational	– Description of openness, e.g. availability of information on the use of participants' input and grounds for decisions – Stakeholders' views on openness, usefulness, and adequacy of participation, and experiences with each participation event – Description of attempts to encourage silent groups to participate – Participants' views on what they (and their organizations) learned
3. Functioning governance *Collaboration is operational in the governance system*	– Effective cross-border collaboration (F) – Cost-effectiveness of collaboration – Organizational learning	Analysis of planning documents, interviews, questionnaires, cost analysis	– Number of productive contacts with other departments during planning – Proportion of costs of participation relative to the overall costs of planning – Number and type of conflicts in the process – Proportion of stakeholders satisfied with the process	– Planner's view on usefulness of cross-border collaboration – Description of the use of information from other departments – Planner's view on cost-efficiency of collaboration – Reasons for dissatisfaction with planning and decisions – Planner's and decision- makers' views on what they and their organizations learned
4. Sustainable use of the area (outcome) *Collaboration helps in guiding the area development in a sustainable direction*	– Better plan – **Better quality of environment** – Enhanced collaboration and decision-making capacity – Follow-up	Analysis of plans, documents specifying the goals for planning, eventual impact assessments, and the implementation procedure,interviews, questionnaires	– Plan quality scores 1-10 – Number of other plans considered in the plan from the perspective of long-term effects on the area – Changes in stakeholders' satisfaction with the environment – Changes in accessibility of vulnerable groups to high-quality areas – Number of useful contacts created during planning	– Stakeholders' views on the quality of the plan – Planner's view on the adequacy of assessing the long-term effects – Stakeholders' views on quality of the environment for current and future generations – Changes in the willingness to collaborate – Description of practices for follow-up, updating and taking into account the other plans

4.4 Ways of thinking challenge the use of experiential knowledge

Consideration of residents' experiential knowledge in planning of green infrastructure is dependent on the ways of planners and decision-makers to think about the role of residents in planning. It also depends on their sensitivity to the existence and meaning of various ways to think about the importance of experiences in relation to ecological issues. Especially from the point of view of building capacities to collaborate and mobilize diverse resources for transforming urban development, it is necessary to learn not so much about facts, interests, and preferences, but about what different actors care about and why, that is, about their values and the ways of thinking from which these values arise (Healey 1997, 37, 267). In line with previous studies (Bäcklund 2007; Bäcklund and Mäntysalo 2010), our interviews supported the view that the ways to think about the role of residents are diverse and produce ambiguity in the Finnish policy and planning system (Article IV). No consensus exists about when in the policy and planning processes the input from residents is most relevant or about if and how the 'representative' decision-makers need to care about residents' input. They think differently also about the role of residents' input in relation to information based on ecological expertise.

In a study based on the same interview data, Jokinen (2009) developed a typology on ways to think about the role of participation in planning concerning urban nature areas. The typology consists of five types (A-E in Table 6). For understanding in particular the conditions for use of resident's knowledge input, we developed another **typology on ways to think about the relation between residents' experiences and ecological issues** (Article IV). Four types were identified: 1) ecological issues are more important than experiences, 2) experiences are more important than ecological issues, 3) experiences and ecological issues are equally important, and 4) the relation between experiences and ecological issues is context-dependent. Instead of categorizing people as representing some of the ways of thinking as such, the typologies suggest that a person's way of thinking can be characterized by one or several types, which can also be emphasized differently. Policies and plans alike could be analysed in terms of the ways of thinking that they express.

In Table 6, I have summarized the two typologies from the point of view of integrating experiential knowledge in planning. Conditions for this integration are best in cases in which the planners' and decision-makers' thinking is characterized by appreciation of experiences, that is some of the thinking types 2, 3, 4, and type A, which regards participation as necessary because of residents' expertise and their authority role. The authority role refers to residents' right to be involved in defining the criteria for a good living environment and green infrastructure as part of it, and their responsibility to take care of the common environment (Articles I and IV; Burman and Säätelä 1991). Appreciation of experiences (types 2, 3, 4) supports the integration also when participation is considered necessary because of residents' expertise (B), but in this view it is planners and decision-makers who need to define the meaning of this expertise, rather than residents themselves. The focus on residents' expertise in nature experiences in type B can mean missing possibilities to use their expertise in other themes (see the typology of information needs in Article IV, Table 1). Type B also lacks recognition of residents as active actors in urban development, as do the types that do not appreciate participation as a way to obtain information for planning (C and D). Seeing the need for participation as related to the role of residents as members of 'the community', with attention to their commitment to their local environment (E), can mean lack of recognition of residents as experts and collaboration partners in issues exceeding what is regarded as 'the local environment'. Regarding participation as a way to foster residents' sense of community (E) can be beneficial for the knowledge integration in the sense that it can mean interest in and recognition of potentials related to networks of local actors. However, expectations of 'communities' can mean lack of sensitivity to residents' own conceptions of existence of communities and what kind of communities, if any, matter to them (see Scott

and Liew 2012).

Our data do not enable in-depth comparisons between officials', decision-makers' and residents' ways of thinking; however, the survey (Article III) provided some examples of how views of planning authorities can be similar to or different from those of a particular group of residents in a specific case. According to the survey, collaborative planning was challenged e.g. by the difference that residents who participated in the planning groups found it important to involve residents early in a planning process, while planning authorities more often felt that allowing residents to comment on a draft of the plan would suffice. If officials' and decision-makers' ways of thinking generally lead to practices that that do not allow participation in levels and phases in which it can be effective from residents' points of view, use of experiential information is unlikely to be improved without system-level changes in these ways of thinking. The survey results that planning authorities preferred not very early participation, residents stressed the need for participation more than did planning authorities, and almost two-thirds of planning authorities but less than one-fifth of residents felt that planning conducted by professionals alone is good enough for implementation can be interpreted as support for the view that use of experiential knowledge continues to be challenged by the strong role of factual, 'non-political' information (exemplified as type 1) in the Finnish planning culture (Bäcklund and Mäntysalo, 2010).

Table 6. Ways to think about the role of participation and the role of experiential knowledge. Ways of thinking A-E and meaning of participation are based on Jokinen (2009), knowledge needed in planning and role of residents are based on Jokinen (2009) and Article IV.

Ways to think about the role of residents' participation	**A. Participants as a resource to planning**	**B. Participants as experts in experiencing nature**	**C. Participants as learners**	**D. Participants as executers of the law**	**E. Participants as members of a community**
Meaning of participation	Moral right, acceptable outcome, way to build knowledge on the experienced environment	Way to build knowledge on the experienced environment	Participants get information, smoother process, less complaints	Less resistance and complaints	Increased sense of community and commitment to the local environment
Knowledge needed in planning	Experiential knowledge needed alongside expert knowledge, based on residents' expertise and their authority role	Experiential knowledge needed alongside expert knowledge, based on residents' expertise	Expert knowledge only	Expert knowledge only	Experiential knowledge recognized in some cases together with expert knowledge
Role of residents	Resident as a citizen and expert	Resident as an expert	Resident as an object	Resident as an object	Resident as a subject
Ways to think about the relation of experiences and ecological issues	2, 3, 4	1, 2, 3, 4	1	1	1, 2, 3, 4

4.5 Ways towards improved use of experiential knowledge in planning

Consideration of residents' values and experiences in planning can be enhanced by influencing the content and quality of their input and maximising its use after it has been obtained. The input can be made more usable in planning by consciously designing its procurement so that it supports meeting the knowledge needs of each particular case. Use of the input can be made more efficient by coordinating its procurement in the municipality and region. This efficiency would also be supported by making more out of the obtained information by interpreting it from different perspectives and directing it to processes in which it can be used. To encourage these kinds of advances, it is useful to reflect on the frames from which the current practices stem. These frames include the logics and characteristics of the local policy and planning system that matter as structural, taken-for-granted conditions for each planning situation, and not distinct from this, the ways of thinking through which officials and decision-makers interpret the system and the role of residents in it. As the system comes to matter through their thoughts and actions guided by the ways of thinking (Healey 1997; see also Flyvbjerg 2001), changes in actors' thinking and its roots are also the foundation from which changes in practices can arise (Healey 1997; Fazey et al. 2006).

At the system level, conditions for using experiential knowledge would be improved by revising planning practices so that they **direct information on residents' values and experiences into levels and phases of planning in which it can be used effectively** (Article IV). In planning green infrastructure, this can be supported by the clarification of the role of experiential knowledge as addressed in this study, including its role at different levels and phases of planning and its potential to improve the information content of planning. In the Finnish context, a key task is to **strengthen the weak connection between residents' values and experiences and the value and knowledge base directing policy-making at the normative level** because this is the level influencing the procurement and use of information in planning processes (Article IV). One way to improve the conditions for using experiential knowledge would be to update norms on when and how collaborative processes must be implemented, by making these **norms more clear in terms of the role of residents' input and the responsibilities of officials and decision-makers in taking it into account**. At the system level, organizational level, and process level, this clarification would support design, evaluation, and follow-up of collaborative planning. At the actor level, it would help all parties of collaborative planning in dealing with the current confusion around the role of residents' input and in basing their own actions on a more shared understanding of what collaboration is about in the particular case. Shared understanding of responsibilities supports development of coordination practices, for example, mediation by departments that are experienced in collaborative planning and operate in a number of contexts (Article II). Binding, legislative norms are necessary for directing participation in levels and phases of planning in which it can be effective and for setting limits for acceptable practices, including preventing shifting of decision-making power from municipalities to forums out of the reach of various residents and their representatives (see Jauhiainen 2012; Mäntysalo and Jarenko 2012).

No less important is the operationalization of norms for strategic planning, which, when successful, leads to more effective procurement and use of information in the strategic planning and further in operative planning (Article IV, Fig. 2). The operationalization of legislative norms would be supported by developing more specific **planning guidelines** that address interpretation of the norms in different types of planning and decision-making processes in different contexts (Article IV). The guidelines should provide principles for defining and studying essential benefits of green infrastructure and its ecosystem services in each case, including what types of information need to be used when and which spatial, temporal, social, and ecological contexts must be considered in

defining stakeholders and desired benefits and conditions for service provision.

In designing planning processes, use of experiential knowledge can be supported by using the quality criteria (Article II, especially the design guide in Table 3) as an inspiration and checklist. The quality of residents' input, and thereby its usability and usefulness in planning, can be directed beforehand by being clear about what residents can and cannot affect and **consciously addressing how their input can be linked to developing the information content of planning in the different phases, and how it is bound with other ongoing policy-making and planning processes**. The typology of needs for residents' input (Article IV, Table 1) and examples of uses of the input in different phases of a process (Article IV, Table 3) provide ideas for this. By this clarification of the role of experiential knowledge, it becomes possible to consciously choose participation tools that help to obtain information from various groups in forms that are appropriate in each situation (e.g. Vervoort et al. 2012; Zurita and Baloian 2012; Juhola et al. 2013; Kyttä et al. 2013a; Vartiainen et al. 2013). The information obtained and, to some extent, information obtained in other contexts could be **interpreted with different perspectives to make more out of it**. For example, input concerning points related to residents' regional lifestyles, even if these were not of interest when the information was obtained, could be analysed from the point of view of supporting cross-border collaboration in planning of attractive and regionally functioning walking and cycling routes.

At the level of actors' thinking, there is a need to **build awareness of the subjectivity and diversity of ways of thinking and the implications of different ways of thinking for the outcomes of planning**. By understanding alternative ways to think about the role of residents and the relation between residents' experiences and ecological issues, people involved in planning and decision-making can adopt a more holistic perspective to the situation and issues at hand. The planning guidelines could support this understanding by illustrating, with case examples, the suitability of different ways of thinking in different planning contexts. The guidelines could also exemplify how analysing specific information inputs from different perspectives can reveal in them aspects that make the information useful for different purposes, also decisions to be made in processes other than the one in question.

Conditions for taking into account various values and expertises are supported by **equal appreciation of knowledges**, whereby no form of knowledge is a priori regarded as more important than another (Article I). Thus, the ways of thinking that regard experiences and ecological issues as equally important (type 3) or see their relation as context-dependent (type 4) can provide a promising ground for knowledge integration in a variety of planning cases. For maintaining ecosystem services, **seeing the relation of experiences and ecological issues as depending on scales and spatial contexts** (a specific view in type 4) **can be particularly useful** because the needs and capacities for provision of ecosystem services are scale-dependent as well (e.g. Fisher et al. 2009; Van Oudenhoven et al. 2012; Hauck et al. 2013a). This also means that the ways of thinking that regard ecological issues as more important than experiences (type 1) or the other way around (type 2) can be particularly useful for availability of services in some scales and spatial contexts and harmful in others.

Adoption of new perspectives can lead to changes in practices in some cases easily, however, other changes may become possible only after changes in ways of thinking occur. Revising on a large scale the current dominance of expert knowledge relative to experiential knowledge may require a general shift of ways of thinking towards those that **appreciate residents in planning due to their expertise and their authority role**, and do not see experiences as subordinate to ecological issues (Article IV, see also Table 6 and discussion above). **Not predefining ecological issues as more important than experiences may be particularly important in the most urban and sub-urban areas**, which are characterized by relatively small size of nature areas, high population density, and multiplicity of stakeholders, and

thereby multiplicity of values and demands related to each piece of land. This is because this is the area 1) that matters for many of the urban residents as they can experience it in their everyday life and 2) where some cultural ecosystem services are irreplaceable (cf. Plieninger et al. 2013). Opportunities to experience and use nature within a walking distance from home, for example, cannot be simply replaced by opportunities in distant areas, first, because meanings people attach to a place are specific to that particular place and, second, losing this easy access to nature is likely to decrease the use of nature by some resident groups (Kabisch and Haase 2014) and thereby realization of benefits of this use, e.g. reduction of stress (Grahn and Stigsdotter 2003).

However, appreciation of experiences **should not lead to degradation of the ecological capacity necessary for provision of the ecosystem services collaboratively defined as important in a particular case**. This means that seeing experiences as more important than ecological issues (type 2) should not dominate so that it causes disregarding of ecological information in planning solutions that crucially affect the ecological conditions for provision of these services. Several urban ecosystem services depend on the outer parts of urban green infrastructure in peri-urban areas, e.g. flood prevention in built-up areas depends on processes of the regional water cycle in upper parts of the catchment area, and services dependent on specific biodiversity can be related to the chances of specific species to move between large nature areas in the peri-urban area and the more urban areas in inner parts of the region. In planning peri-urban areas and their connections to more urban areas, these conditions for service provision should not be neglected by strong prioritization of experiences. For example, when the aim is to maintain flood prevention service, paved areas to enable specific recreation uses should not be allowed to the extent that they threaten the functioning water cycle. To maintain biodiversity, the functioning of large nature areas as parts of ecological networks should not be threatened by, for example, constructing route that attract users to the most sensitive parts of these areas.

Maintaining the capacity of the system to use different knowledges effectively benefits from creating follow-up practices that make successes and failures of collaboration visible, enabling learning from both. Planning organizations could be encouraged to pay attention to effective use of knowledge by, for example, establishing awards such as 'Knowledge User of the Year' and publishing results of the performance of each organization. The creation of follow-up practices can be supported by case-specific operationalization of the evaluation and design framework (Article II). Besides specific evaluation projects and tasks, learning can be supported by embedding practices of reflection in the normal work of planning and decision-making. For example, when decision-makers receive proposals for strategic plans, they could study them to learn about how the input obtained from residents in preparing these plans corresponds with the value basis of urban policies (Article IV) and the values that the decision-makers personally support.

5 Concluding remarks

As in earlier attempts to develop collaborative approaches to planning (see Section 2.3), this dissertation can be accused of disregarding 'the dark side' of collaboration and the use of experiential knowledge that matters in practice. Use of the input from residents' participation can lead to less desirable outcomes from the points of view of some groups, e.g. when some actors have dominated the sense-making and knowledge-building process at the expense of others, when the input is used to justify particular political interests (Cleaver 2001; Demszky and Nassehi 2012; Pfeffer et al. 2013), or when the nature of experiential knowledge is misunderstood (see Fazey et al. 2006; Innes and Booher 2013). However, all knowledge types have their drawbacks, and planning processes are prone to strategic use of knowledge, whether participatory or not (Saarikoski and Raitio 2013). Literature on the challenges of

collaborative planning is abundant, but planning processes benefit more from examining how things could be done better than focusing on challenges (Forester 2013; see also Flyvbjerg 2001; Sager 2012).

This study does not claim that collaboration and use of experiential knowledge lead to better outcomes in any context. It claims that by understanding the role and nature of experiential knowledge it is possible to design processes that are more effective in enhancing municipal democracy and, in the long run, urban sustainability. I discussed experiential knowledge as a necessity for value guidance for policies and plans, for planning cultural ecosystem services and cultural dimensions of other ecosystem services, for making green infrastructure functional from the point of view of many residents, for enhancing capacities for production of well-being benefits, and for assessing how policy-making and planning succeed in supporting residents' well-being and these capacities. This is a contribution to the still limited research of the interaction between evaluation and design of collaborative planning, knowledge integration, spatial planning, and urban green infrastructure and ecosystem services.

As success in enhancing urban sustainability is not possible without grounding actions in particularities of the local context, the findings of this study are likely to be most useful in policy and planning settings similar to those in Finland. However, the findings can also support policy-making, planning, and research elsewhere, on a general level also in fields other than urban green infrastructure. The challenges in collaborative planning and integration of different knowledges are not unique to this specific field (see e.g. Rowe et al. 2004; Raymond et al. 2010; Delvaux and Schoenaers 2012). Therefore, the methods developed – the evaluation and design framework, the typology of needs for residents' input, and the typology of ways of thinking – can as interpretation frames inspire practical and scientific activities related to these issues also in other contexts. Described in the Finnish urban green infrastructure context, the findings on need for and quality, evaluation and design, challenges, and improvement of collaborative planning can support learning for other contexts as people find in them new perspectives that can be applied to similar kinds of cases.

As with outputs of research in general, any application of the findings for a specific purpose needs to be sensitive to that purpose and the contextual factors involved. This means, among other things, specifying who 'residents' are in the particular case and taking into account how interpretations of such concepts as 'green space' or 'urban nature' can vary across spatial-temporal settings, especially if the aim is to make comparisons between cases located in different cultural areas (Clark 2006). Settings for integrating residents' values and experiences in planning of green infrastructure can be very different, for example, in cities that have specific policies or strategies for developing their green infrastructure as compared with cities that only plan the management (Konijnendijk 1999). I find the idea of agonism usable also here; it can be helpful to start from the premise that realities are many and there may not be a single version of, for example, the need typology that works well in all cases. But like the diversity of actors' lifeworlds does not necessarily make agreement in a planning process impossible (Lysgård and Cruickshank 2013), a single version of, for example, the need typology, can be usable in different cases.

The findings on ways of thinking and the survey results on experiences with collaborative urban forest planning in Helsinki support previous studies (e.g. Callahan 2007; Asikainen and Jokinen 2009; Demszky and Nassehi, 2012; Leino and Laine, 2012; Bäcklund et al. 2013) in suggesting that also in Finland as well as the planning of green infrastructure the role and thereby the quality of collaborative planning are unclear. With the success criteria, the typology of issues in residents' input, and the specification of needs for residents' input at the different levels of policy-making and planning, the study contributed to clarifying this quality. This creates a foundation for designing participation with sensitivity to the nature of issues to be handled in the process in question, thereby being more efficient for planning and stakeholders.

The conscious design would also contribute to the need to make administrative and political structures reflexive for advances in knowledge of urban ecosystem services (Pataki et al. 2011). In collaborative planning clarified in terms of residents' role in knowledge-building, these advances can be made and experiential knowledge can serve to ground various information inputs to local particularities, necessary also for making scientific advances locally relevant.

Challenges linked to ways of thinking were addressed, with some specific knowledge types emerging as more important than others regardless of the type of process and spatial context concerned. The discussion on the meaning of the identified ways of thinking is a contribution to the more general need to understand how some ways of thinking empower and others disempower (Innes and Booher 2013). In urban conditions, prioritizing ecological expert knowledge over experiential knowledge means that provision of ecosystem services may be directed with unrealistic expectations of the benefits that residents will derive. The ecosystems therefore may not support the well-being of various residents as well as they could. Especially taking into account that the tradition to emphasize 'non-political', factual knowledge is strong in Finland (Bäcklund and Mäntysalo 2010) and elsewhere (Haas 2004; Holden 2012; Innes and Booher 2013), this problem is in urban conditions more pressing than problems with letting experiences come ahead of ecological issues (cf. Flyvbjerg 2001). The findings from the interviews and the survey confirmed previous interpretations (e.g. Bäcklund 2007; Bäcklund and Mäntysalo 2010) that in Finland ways of thinking supporting consideration of residents' values and experiences exist, but how much they matter is up to the administrative actors and decision-makers involved in each specific case. This can be understood as an example of the bounded rationality of planning (Forester 1984; Innes & Booher 2010).

The randomness of use of residents' input partly arises from the planning norms that do not generally encourage integrating participation in the process of sense-making and knowledge-building. Legislative norms that necessitate use of ecological information, but leave the role of information from residents vague are, through actions (Flyvbjerg 2001), a cause for and a result of actors' ways of thinking (Healey 1997). Collaborative planning has been blamed for over-emphasizing the capacity of individual agency and neglecting issues of structure (e.g. Fainstein 2000; see Harris 2002, 32). However, through reflecting on the ways of thinking, also the capacity to question and revise structures is in the hands of people themselves. Norms change slowly, but grounds for even these changes evolve in the constant change of planning ideals (Bäcklund and Mäntysalo 2010), which the diversity of the ways of thinking also reflects. Experiences cannot be integrated in legislation and regulations as such, because the core characteristics of experience are lost in the process of abstraction and scientization (Demszky and Nassehi 2012). However, this transformation is the beginning of a new cycle in public policy (Demszky and Nassehi 2012), and therefore, over time inputs from residents, both descriptive and systematized (e.g. Tyrväinen et al. 2007; Kyttä et al. 2013a; Schmidt-Thomé et al. 2013), can slowly make policies evolve. Such policy changes can be shaped also by outcomes of research on the role of residents' input, such as this dissertation. In the urban green infrastructure context, interest in residents' experiences can increase as the growing research on nature and health (e.g. Moseley et al. 2013; Tsunetsugu et al. 2013) produces understanding of green infrastructure characteristics that matter for human well-being.

Norms in legislation and planning guidelines complement each other in the striving for an appropriate balance between stability and flexibility, necessary for adaptability of the urban system in changing conditions (Collier et al. 2013). While binding norms constitute the explicit frame for what is acceptable, guidelines can direct implementation of legislative norms with details that in legislation would unnecessarily increase the bureaucracy in policy-making and planning. Guidelines can be the glue that helps avoid difficult-to-disagree-on sustainability concepts from remaining merely as tools for different perspectives to argue against

each other (see Rosol 2013 for an illustrative case on battles around urban densification). In guidelines, it is possible to illustrate with cases, for example, the core ideas of the ecosystem service approach and its usability in planning. Guidelines can, more concretely than legislation, bring forth the idea of this approach to shift focus from preventing harm to opportunities of integrative production of multiple benefits – also in transforming collaboration from a burden to a means of progress. Making use of experiential knowledge means strengthening the role of residents in shaping and taking responsibility for urban development. In any case, binding norms are there to buffer local decisions that cumulatively would lead to radical rapid changes in urban regions. In this sense, the fear that involving residents at the local level will not lead to a good outcome (e.g. Fainstein 2000) may be exaggerated.

The tools developed here diversify the current array of tools, adding certain special characteristics. The typology of needs for residents' input can be used as a source of inspiration in obtaining information, for example, for policies and plans aiming to affect provision of cultural ecosystem services in the region. Current tools for this include service typologies (e.g. CICES 2013; Plieninger et al. 2013). Like service typologies, the need typology can work as a checklist in discussing what kinds of information contents would take precedence in the case concerned, with attention to the type of knowledge needs at the particular level and phase of policy-making or planning. Service typologies can help in covering different types of services and in compiling, for example, questionnaires on which services and benefits specific groups find important where and why. The need typology is as such less concrete for that purpose. Instead, it can help in covering different topics about services and benefits, e.g. their changes as part of local history, their current availability, use and non-use, and development potentials. As the need typology is not limited to services, it helps in considering issues that can matter outside the service approach, for example, experienced spatial entities and aspects of local collaboration history. Thus, it can help in shifting the prevailing focus on valuing predefined services and benefits (e.g. Reyers et al. 2013) towards consideration of value aspects in different phases of planning service provision, and planning of land use and management and development of nature areas more generally.

The framework for evaluation and design of collaborative planning is to my knowledge the first evaluation framework developed in a European urban green infrastructure context and the first one presenting success criteria in this specific format. One of its differences to many other frameworks (e.g. Innes and Booher 1999, Buchy and Hoverman 2000; Mandarano 2008; Laurian and Shaw 2009) is that it suggests priorities, making it easier to decide how improvement of collaboration could start. It also directs attention to power relations that evaluation frameworks often hide (Bickerstaff and Walker 2005). Analysing what knowledge is obtained and actually used can help to identify powerful actors and effective ways of having an impact. Participants' experiences can help to determine whether the planning organization is open enough about the power structure and to shed light on how power is utilized in collaborative events. The criteria descriptions address operationalization of the framework especially in the urban green infrastructure context, but the generality of the criteria makes the framework usable for planning settings beyond urban and nature-related issues.

The typology of ways to think about experiences in relation to ecological issues can be seen as an extension to typologies, e.g. on the role of collaboration in planning (Wesselink et al. 2011) and on worldviews, including nature relations and conceptions of knowledge (Van Opstal and Hugé 2013). By typifying perspectives that conflict in their interpretations of ways towards sustainability, this typology is one means of promoting the dialogue between these perspectives without which the goals of sustainability cannot be reached (Van Opstal and Hugé 2013). It brings an insight into the role of collaboration as enabling this dialogue in constructing the value base for planning and decision-making on urban green infrastructure. Details of the different emphases on ecologi-

cal issues and experiences are linked to actors of each specific case. The general idea of this typology is, however, applicable in a range of cases where the human relationship to nature is studied, as ecological issues and experiences are universal dimensions (Spaargaren and Mol 1992). Using the typology for analysing policies on one hand and residents' values on the other could help in making incoherencies between the two explicit, thereby evaluating the functioning of the representative democracy. The typology is abstract for strategic spatial planning, which can benefit more directly from typologies that address, with spatial applications, residents' lifestyles, including their mobility patterns connected to their preferences for nature in their living environment (e.g. Kyttä et al. 2013b). The typology developed in this study can, however, provide an additional perspective to the nature relation addressed in such typologies.

One of many factors that influence actors' ways of thinking is their educational background. People responsible for design and implementation of education programmes are one of the groups whose ways of thinking are, through their influence on students, particularly significant for the future of urban regions. For widely affecting the ways in which residents' values and experiences are used and not used, also ways of thinking of people designing various research and evaluation activities, including research funders, can be influential. The complexity around experiential knowledge and urban systems is an inexhaustible source of inspiration for researchers, and those willing to help planning practice cannot survive without reflecting on their own approaches and ways of thinking in interaction with others' everyday life perspectives. Significant also are the ways of thinking of developers of data services and systems and planning software and those who address use of these for planners and other users.

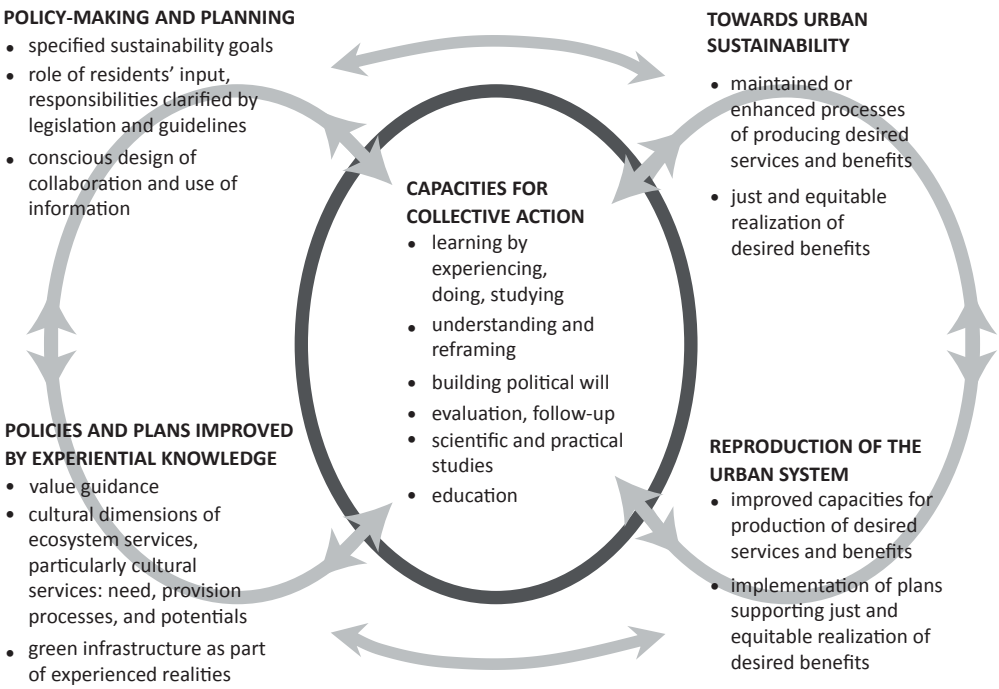

Figure 5. Key processes for enhancing urban sustainability through improved use of experiential knowledge in planning of urban green infrastructure.

Shifts towards a balanced appreciation of different knowledges, and thereby increased capacities to meet local sustainability goals, can emerge in processes in which various actors communicate about integration of knowledges and reflect on its impact in real-life cases. Actors, including residents, planners, decision-makers, and those mentioned above, could continuously learn together in such processes related to planning, research, education, evaluation, and development of tools for collaboration (see Fig. 5). Opportunities to build collaboration capacities are widened by technological advances, e.g. in the development of mobile knowledge creation systems (e.g. Zurita and Baloian 2012) and open integrated data systems linked to production and use of experience-based information such as the services '*Harava'* (Rake) and '*Liiteri'* (Shed) developed as part of the e-democracy programme of the government of Finland (Vartiainen et al. 2013). In Finland, experiential knowledge is also becoming an economic object, as markets are emerging for services to obtain and manage spatial information on residents' experiences for planning (Nummi-Sund 2013). These developments support a more balanced appreciation of different knowledge types. However, this likely requires that the use of the knowledge creation systems and services is based on understanding the nature of different knowledge types and the dependency of the outcome on how the systems and services are used. One way to support this would be to include in experts' education opportunities to learn by experiments in which the role of various actors' values and experiences, including residents' and their own, is made visible in testing how finding connections between these values and experiences makes sense for outcomes of specific projects.

In the processes bringing various actors together, ideas and suggestions from studies like this can be reflected on and considered for testing in practice. The interaction with non-scientific perspectives is the ground for researchers to design their future work as relevant for planning practitioners, in the long run transforming policy cycles. An important topic of future research on urban green infrastructure would be to specify the kinds of experiential, ecological, and economic information inputs needed for planning ecosystem services in different types of urban areas and regions and effective approaches for their integration in planning. This necessarily includes understanding how the outcome of any attempt to obtain information from residents depends on how successful the attempt is in supporting holistically meaningful participation and membership of the society at large, from the perspectives of various resident groups. Attention needs to be paid to what the less open partnership practices mean for the planning of urban green infrastructure and its outcome. Particularly welcome would be a study addressing how these practices could support rather than hinder holistically meaningful participation and simultaneously the integration of diverse views and knowledges in influential decisions. Linking learning from 'democracy innovations' across fields, cultures, and geographical contexts (e.g. Singh and Walsh 2012) with case-specific examination of residents' diverse lifestyles and agency roles would boost discovery of ways to make local planning practices contribute to large-scale shifts towards more just and acceptable urban futures.

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Department of Geosciences and Geography A26
ISSN-L 1798-7911
ISSN 1798-7911 (print)
ISBN 978-952-10-9463-7 (paperback)
ISBN 978-952-10-9464-4 (PDF)
http://ethesis.helsinki.fi/

Unigrafia
Helsinki 2014

UNIVERSITY OF HELSINKI
FACULTY OF SCIENCE